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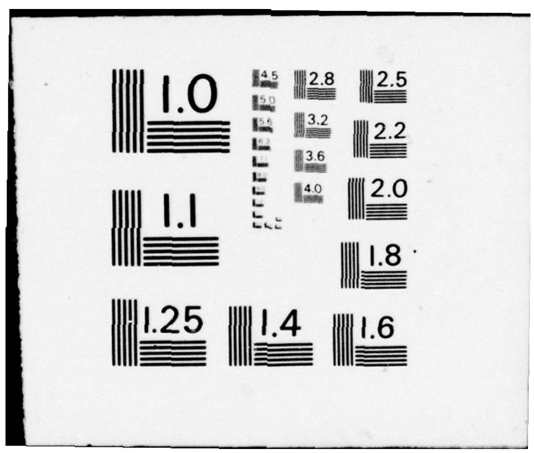
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THE FEASIBILITY OF A GEOGRAPHIC PAY SUPPLEMENT FOR CONUS MILITARY PERSONNEL

CENTER FOR NAVAL ANALYSES
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This report considers the feasibility and desirability of making adjustments to military pay to correct for regional variation in the cost of living in the Continental United States (CONUS). First, the adequacy of existing data bases for implementing a pay adjustment is assessed. Next, the feasibility of using cost-of-living indexes for specific items to correct for regional differences in overall living costs is explored. Then, 1975 housing expenditure data provided by the Naval Facilities Engineering Command is used to construct housing cost indexes for 118 CONUS military → next page

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cont. 20 installations. Various ways of grouping CONUS installations for the purpose of implementing a variable housing allowance (VHA) are suggested and the costs of several alternative VHA plans are estimated. Finally, an evaluation of the arguments for and against a geographic pay adjustment is provided.

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SUMMARY

There has been concern for some time that the current system, in which personnel receive the same pay regardless of their duty station, imposes a hardship on personnel assigned to high cost-of-living areas. This study examined the extent to which it is currently feasible, as well as desirable, to provide military personnel in the Continental United States with a geographic pay adjustment (GPA) to account for regional differences in living costs.

THE FEASIBILITY OF A GPA

Data Availability and Adequacy

The federal government (Bureau of Labor Statistics) publishes annually only one set of data on regional cost-of-living differences, the Urban Family Standard Budgets' cost-of-living (COL) indexes. These data contain COL indexes for 38 metropolitan areas and 4 regional "non-metropolitan" areas. In addition, cost indexes for seven commodity categories (housing, food, transportation, medical care, personal care, clothing, and other items) are provided.

These data were examined and judged to be inadequate for the purposes of a GPA. Only 20 percent of CONUS military personnel were found to be in the 38 metropolitan areas for which COL indexes are available. The other 80 percent of personnel would not be fairly represented by the four regional "non-metropolitan" area indexes. There are large metropolitan areas for which data are not available, and the personnel in these other areas would not be fairly represented by one of the "non-metropolitan" indexes. A 1969 study by the National Industrial Conference Board studied these data and found that national companies would be unable to use them for pay adjustment purposes for the same reasons.

There does exist one source of data on prices paid by CONUS military personnel, the Naval Facilities Engineering Command (NAVFAC) housing expenditure data. NAVFAC surveys personnel at each CONUS installation and obtains estimates, by rank, of average monthly housing costs. Installations are surveyed on a rotating basis at least once every 3 years. These are the only currently available data on prices paid by military personnel on an installation-by-installation basis.

How the NAVFAC data might be used in the implementation of a GPA was then considered. First, could the NAVFAC data be used to adjust total pay? It was suggested that they should not be used in this fashion, for two reasons. First, the data are correlated, but not perfectly, with overall living costs. There will be areas which have high (low) housing costs which have low (high) overall living costs. Use of a specific commodity cost index to adjust total pay will thus lead to errors in adjustment of compensation at some installations. Second, analysis of the Family Budgets' COL indexes showed that the geographic variation in housing costs is much larger than the

geographical variation in overall living costs. Using a housing cost index to adjust total pay would lead to overadjustment of pay of those personnel in high housing cost areas and underadjustment of pay of those personnel in low housing cost areas.

The basic conclusion was, then, that an overall COL adjustment cannot be made from available data. Data adequate for this purpose do not exist. If policy-makers opt for an overall COL adjustment, data will have to be generated via price surveys in areas in which military installations are located.

The next question was whether the NAVFAC data might be used to adjust some portion of pay which reflects the dollars available for housing, without introducing more geographic variation in real pay than currently exists. There was concern that if prices are not uniformly high or low within given areas, then adjusting some portion of pay for variation in housing costs would add to the geographic variation in total real pay rather than reducing it. Knowledge was needed of whether the prices of different commodities are positively or negatively correlated across geographic areas.

To get at this question, the various commodity COL indexes in the BLS data were correlated, and virtually no negative correlations were found. The costs of different commodities appears to be positively correlated across geographic areas. If these results hold for all geographic areas, then adjusting some portion of pay representing housing dollars on the basis of a housing cost index will, in fact, reduce the geographic variation in real pay, although not completely eliminate it.

Construction of Installation Housing Cost Indexes

Several tasks were performed using the NAVFAC data. First, the national average monthly housing cost (MHC) of personnel in six officer and six enlisted pay grades was compared with the RMC and BAQ of personnel in these ranks. For January 1975 data, MHC was found to be 22.1 percent of average officer RMC and 25.1 percent of average enlisted RMC. MHC was further found to be 68.5 percent greater than average officer BAQ and 44.9 percent greater than average enlisted BAQ. Second, housing cost indexes (HCIs) were constructed for 118 CONUS installations. The index for each installation is a weighted average of the monthly housing costs of personnel in six officer and six enlisted paygrades. Separate indexes for officers and enlisted personnel were also constructed. Indexes could be constructed for only 118 installations because data for other installations were either unavailable or unusable. The installations included in the indexes housed 74 percent of the June 30, 1975 CONUS force.

Generally speaking, the indexes that were constructed came out as expected. The range on the all personnel index was from 75 (Ft. Polk, La.) to 121 (Boston, Mass.). There are distinct rural/urban differences as well as regional differences in these indexes. The highest housing costs were displayed in the large metropolitan areas. The lowest costs were displayed in rural Southern and Midwestern areas.

Installations were then categorized for the purpose of implementing a variable housing allowance (VHA). Categorizations had to satisfy two criteria. There should be a small number of categories so that the plan would be administratively easy to implement, but the number should not be so few that installations with truly dissimilar housing costs are lumped together. Clearly, there is a tradeoff between these criteria.

Categorizations based on 5 percent, 10 percent, and 15 percent increments in the all personnel HCI were made. The 5 percent categorization produced nine categories of installations, while the other two produced six and four categories, respectively. It was suggested that the 10 percent or 15 percent categorizations are preferable. They produce a relatively small number of categories without appearing to lump truly dissimilar installations together.

After categorizing the installations for which cost indexes were available, all the CONUS installations for which indexes were not available were categorized by examining the indexes for installations in close geographic proximity with known indexes together with subjective judgments about the category in which these installations belong.

Several prototype VHA plans were then considered. These plans varied according to (1) the base for the VHA and (2) whether officers and enlisted personnel will be treated separately. The base for the VHA is the portion of RMC which is identified as dollars available for housing. Under alternative assumptions, six different measures of the housing dollars available in RMC were identified. The first measure was current BAQ. The other measures included BAQ plus either (1) the tax advantage implicit in BAQ (computed two different ways), (2) a portion of the 1971-73 pay raises identified as dollars for housing, or (3) both (1) and (2).

Instead of using BAQ or some other measure of housing dollars as the basis for a VHA, an alternative procedure would be to choose some fraction of pay, e.g., .20, as the basis. The housing dollars available for housing would be this specified fraction times pay. Under a salary system the base would have to be some fraction of salary or pay, since under this system there would be no separate allowance on which to base the VHA. Since the fractional base would probably be the share of housing costs in civilian budgets, such estimates were obtained for various income classes of civilians from the 1970 Census and the 1973 Current Housing Report.

For each of the three categorizations and each measure of housing dollars, the VHA adjustment factor for each category of installations is the percentage excess of average MHC in the category over the given measure of housing dollars. These adjustment factors were provided for the various prototype plans.

Because consideration may be given to separate treatment of officers and enlisted personnel, separate VHA adjustment factors were computed for officers and enlisted personnel. For the plans based on BAQ or one of the other measures derived from BAQ,

officers in a given category of installations would receive a larger percentage VHA adjustment than enlisted personnel because of the fact that officers currently have higher housing costs relative to BAQ than enlisted personnel. However, in the plans based on some specified fraction of pay, enlisted personnel would receive a larger percentage VHA adjustment than officers, unless this specified fraction is lower for officers than enlisted personnel. This result holds because housing costs are a larger fraction of enlisted pay than officer pay.

Next, the cost of the various prototype plans was considered. Only plans which would pay a VHA to personnel at installations where housing costs exceed the housing dollars available in pay were considered. Plans which would reduce pay at installations where housing costs are below available housing dollars were not.

The plan based on current BAQ would be the most expensive. If this plan pays a VHA at each category of installations equal to 100 percent of the difference between average MHC for the category and BAQ, the plan will cost approximately $635 million. Plans based on other, more stringent measures of the housing dollars available in pay would cost less. A plan which uses 20 percent of pay as the base would cost approximately $300 million.

THE DESIRABILITY OF A GPA

There are several desirability issues. Obviously, one relates to cost. On the surface, the VHA plans considered here would not be cheap. However, these cost estimates are made on the assumptions that such a program is to be implemented instantaneously, and other components of pay will remain unchanged. The "cost" of the plan hinges upon whether total pay will be higher with such a plan than it would have been without such a plan. If the plan were to be integrated into the next several pay raises such that those personnel at the high housing cost installations receive above average pay raises and those at the low housing cost installations receive lower than average pay raises the plan could be implemented without a significant budgetary impact.

Certain arguments have been ventured against a GPA. One is that personnel transferred from high cost areas to low cost areas will view the loss of the VHA as an unfair pay cut. Another is that assignment to high and low cost areas probably balance out over the course of a military career, so that a GPA is not necessary. We tend to discount these arguments. A recent survey has found that a majority of personnel is in favor of a VHA. The second argument does not hold either in the case of non-careerists or careerists assigned only to high cost areas during their careers. However, a VHA plan may have allocative effects which are unknown at this point. It is not known what effects such a plan will have on recruiting and retention. A GPA, for instance, may affect the supply of recruits to the different services if one service benefits from a GPA more than the others. There is currently no empirical data with which to estimate such potential effects, although we do not believe they would be very significant.

The primary reason for implementing a GPA is one of equity. The extent to which a duty assignment in a high cost-of-living area imposes a hardship on a serviceman is something which is impossible to measure quantitatively. Judgments about the inequity of the current system are inherently value judgments. Before implementing a GPA, policy-makers will have to evaluate the extent of the inequity and the extent to which they should attempt to reduce geographic differentials in living costs.

CONCLUSIONS AND RECOMMENDATIONS

A VHA is currently feasible although an adjustment to total pay is not. If policy-makers opt for an adjustment to total pay, a new price survey which generates the necessary data base will be needed.

If it is decided that a VHA will be implemented, we strongly recommend that better housing cost data be obtained. There are some problems in the NAVFAC data which need resolution if the NAVFAC data are to serve as a fully adequate data base. The problems with the NAVFAC data are (1) all installations are not surveyed contemporaneously, (2) the by-rank MHC averages are, in many cases, based on very small samples and appear to be subject to a great deal of sampling variation, (3) the survey is conducted by mail and, if personnel recognized that the survey formed the basis for a VHA, they would have the incentive to overstate housing costs, and (4) the survey does not control for the quantity or quality of housing.

An alternative way of obtaining housing cost data is to define one or several standard types of housing units and have a team of surveyors determine the costs of such units in the different areas where military installations are located. A properly designed survey would eliminate the above mentioned defects in the current NAVFAC survey.

INTRODUCTION

This report considers the feasibility and desirability of making geographic adjustments to military pay (denoted hereafter as GPA) to correct for regional variation in the cost of living in the Continental United States (CONUS). The basic policy question is whether an attempt should be made to ensure that military personnel receive incomes which are comparable in real terms regardless of their duty station. The results will help provide the basis for such a decision.

The report is divided into four major sections. The first asks whether adequate geographic price level or cost-of-living data on which to base a GPA currently exists.

The second section attempts to answer several questions, the basic question being how available data should be used. While an overall cost-of-living index should be used to adjust Regular Military Compensation (RMC), an overall cost-of-living index may not be available. If, rather, a housing cost index is available, could this index be used to adjust RMC? If the housing cost index is ruled out as an adjustor for RMC, could it still be used as an adjustor for a specific component of pay, i.e., basic allowance for quarters (BAQ)? This is an important question, for it is possible that if BAQ is adjusted rather than RMC, the extent of geographic variation in real pay will be <u>increased</u> rather than reduced.

In the third section, Naval Facilities Engineering Command (NAVFAC) housing cost data are used to construct housing cost indexes for 118 CONUS installations that house 89.9 percent of the June 30, 1975 CONUS force. Then, various ways of grouping installations for the purposes of a Variable Housing Allowance (VHA) are considered. Installations for which housing cost data are not available are grouped using information on known installations. Finally, cost estimates for different plans are made. It is suggested that these cost estimates may be more apparent than real, depending on how the VHA is introduced and integrated with future changes in pay.

Finally, an evaluation of the GPA concept and suggestions for ways to implement it, should such a decision be made, are provided.

THE EXISTING DATA ON INTERAREA VARIATION IN THE COST OF LIVING

The Federal Government constructs, on a continuing basis, two regional series pertaining to price levels or living costs. The first series is a consumer price index which is constructed for 56 geographic areas. These area consumer price indexes are time price indexes which have as a base January 1967. The indexes indicate period to period price changes within a particular area and cannot be used to infer interarea variation in price levels. Each area index has a base period index of 100 for January 1967, but a January 1967 index of 100 in one area does not indicate the same level of prices as an index of 100 for another area. One could not infer how much interarea variation there is in prices from these indexes, and they could not be incorporated into construction of a GPA.

A second data series, the Urban Family Standard Budgets, can be used to make inferences about interarea variation in living costs. The budget (nominal income) required to obtain "lower," "intermediate," and "higher" standards of living are computed yearly in Autumn for 38 CONUS metropolitan areas and 4 non-metropolitan areas.[1] The total budget required to obtain each specified level of living in each area is decomposed into the following commodity categories: food, housing, transportation, clothing, personal care, medical care, and other items. For each geographic area, cost-of-living (COL) indexes at each level of living are computed for the total budget and each commodity category within the total budget by dividing the expenditures required in the given budget category by the national average expenditure for that category.

Because the commodity baskets are, in many cases, not held constant from area to area, these indexes are COL and not price (P) indexes.[2] Because of the interarea variation in the market basket, a question arises as to whether these COL indexes really

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[1]The most recent data are found in reference 1. Previous years' data are found in reference 2, various yearly editions. Technical analyses of the methodology used to construct the budgets are found in reference 3. The market baskets selected for these budget studies reflect the consumption pattern of a family of four: 38 year-old husband, a non-working wife, 13 year-old son, and 7 year-old daughter.

[2]As examples of the interarea variation in the market basket (1) the food basket in the Southern areas contains more pork and chicken and less beef than that in the Northeastern areas, (2) clothing quantities vary geographically, (3) the mix of private and public transportation depends upon the adequacy of available transportation in each survey area, and (4) heating and air conditioning requirements vary geographically.

provide useful information about interarea variation in prices. Sherwood (reference 4) has examined this issue and found the problem not to be very important.

However, the question arises as to whether these indexes could be used as the basis for a GPA even if one overlooks the fact that they are COL indexes and not P indexes. To be judged to be adequate for the purposes of a GPA, the primary criterion would be what proportion of CONUS personnel are located in the 38 metropolitan areas. Using June 1974 CONUS force strength data, we estimated that there were 262,241 personnel in these areas, 19.77 percent of total CONUS personnel at that time.

The problem which thus arises is whether the four regional non-metropolitan indexes could be used as the basis for a GPA for the 80.23 percent of personnel not located in the 38 metropolitan areas for which COL indexes are computed. These indexes will not be adequate if there is significant variation in living costs among the installations located in the non-metropolitan areas. There are many large metropolitan areas excluded which contain military personnel. Also, there is likely to be significant variation across areas in living costs within each of the four "non-metropolitan" areas. Therefore, we judge that this data is not adequate for the purposes of a GPA. These indexes would not accurately reflect the living costs of substantial numbers of CONUS military personnel.

A study conducted in 1969 by the National Industrial Conference Board (reference 5) investigated the feasibility of geographic pay adjustments for white collar workers employed by national companies (most of whom still pay a single salary to white collar workers regardless of location). The Family Budgets indexes, as well as all other data, were found inadequate for the same reasons. Indexes are not available for a substantial number of areas in which white collar workers are located.

Other sources of data on regional variation in prices were examined and found inadequate for the purposes of a GPA. The Federal Home Loan Bank Board computes average transaction price of new and existing homes for 18 major U.S. cities on a monthly basis. Again, the fact that these prices are for only 18 areas makes them inadequate for our purposes. A more comprehensive data source is the National Association of Home Builder's index of construction costs, which is constructed bimonthly for approximately 400 geographic areas. The basic problem with this index is that the land component of housing prices is not included, and the price of this component is likely to be one of the significant sources of geographic variation in housing costs. Also, the fact that this is an index of construction costs of new housing, and does not reflect prices of existing housing makes this index rather unappealing.

The only source of data pertaining to the living costs of military personnel is the Naval Facilities Engineering Command (NAVFAC) data on family housing costs. NAVFAC performs a housing survey at each CONUS installation at least once every three years. A random sample of individuals is taken by rank, and their monthly housing expenditures (including utilities) are obtained. In the 1975 data, the average monthly housing

expenditures by rank and class of housing (rental, trailer, owner-occupied), along with the sample size for each rank and class of housing, are reported.

Since this is the only data available on an installation-by-installation basis, in the next section we consider how, and whether, this data should be used in implementing a GPA (or, more appropriately, a VHA, if only the housing component of pay is adjusted).

REGIONAL VARIATION IN LIVING COSTS AND THE APPROPRIATE GPA INDEX

A major issue in GPA analysis is whether an overall price or cost-of-living index is the only basis for adjusting pay or whether a GPA based upon a specific commodity price index such as housing could be used. It would be agreed that if overall price indexes for all areas in which military installations are located were available, then a GPA made to RMC and based upon these indexes would bring about equality across areas in the purchasing power of RMC. Such an adjustment might be considered a "first-best" solution to the equity problem. However, if an overall price index for each area is not available, policy makers might resort to basing a GPA on what data is available. The question to be addressed here is whether a GPA based upon a specific commodity price index would eliminate completely, reduce, or increase the geographic variation in real pay. Numerical examples of each of these possibilities are provided and then the Family Budgets COL indexes are analyzed to see which case most likely describes the CONUS situation. Finally, an investigation is made into which specific commodity is the most likely candidate on which to base a GPA.

To begin with the numerical examples, assume that there are three geographic regions and two commodities, food and housing. Assume in each case that food and housing each occupy half of the consumer budget.[1]

---

[1] It may be shown that an overall price index is a weighted average of the price indexes for the individual commodities included in the overall index, where the weights are the shares of the commodities in the total budget:

$$I_o = \sum_{i=1}^{n} W_i I_i$$

where I_o = overall price index, I_i = price index for the ith commodity category, and W_i = budget share for ith commodity.

Consider Case A below. In this example, each area has the same price index for both food and housing. The covariation between food and housing is "perfect," and the variance of the overall index is the same as the variance of each of the individual indexes.[1]

CASE A

Price index	Region 1	Region 2	Region 3
Food	102	100	98
Housing	102	100	98
Overall	102	100	98

If these were the area price indexes, it would obviously not matter whether a GPA is based upon the overall index or one of the two commodity price indexes. Second, implementation of a GPA which utilizes one of the commodity indexes and makes an adjustment only to that portion of income spent on the index commodity would be a move towards full equity but would not bring about full equity. In the example above, if a GPA were made to half of RMC and based on the housing (or food) indexes, one half of the geographic variation would be eliminated.[2]

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[1]Formally, the variance of the overall index, V_o, is a linear function of the variances of the individual commodity indexes, the V_i's, and the budget shares, the W_i's. It may be shown that

$$V_o = \sum_{i=1}^{n} W_i^2 V_i + 2 \sum_{i \neq j} W_i W_j \, COV(I_i, I_j)$$

Covariance $[COV(I_i I_j)]$ is a measure of the joint geographic variation in the indexes I_i and I_j. The reader is referred to any basic statistics text for computing formulas for variance and covariance. In Case A above, $V_F = 4$, $V_H = 4$, COV (F, H) = 4, and $V_o = 4$.

[2]We have not said how the GPA is to be implemented. In Case A, for example, the GPA could take the form of a 2 percent increase in the income of individuals in region 1, no adjustment to those in region 2, and a 2 percent reduction in the income of those in region 3. Or, it could take the form of a 4 percent increase in the incomes of those in region 1, a 2 percent increase to those in region 2, and no adjustment to those in region 3. Of course, the second method would be preferred by the inhabitants of the three regions, since everyone would be better off under the second method than the first. The propositions being established above are not altered by the manner in which the GPA is implemented.

Consider an opposite case, Case B. Here there is geographic variation in the price indexes of the two commodities, but no variation in the overall index. The price indexes are prefectly negatively correlated.

CASE B

Price index	Region 1	Region 2	Region 3
Food	102	100	98
Housing	98	100	102
Overall	100	100	100

In this case, one would know not to implement a GPA because there is no variation in RMC in real terms. It is clear that if one had knowledge of only one of the commodity indexes and implemented a GPA on the basis of this index, geographic variation in real RMC would be introduced where none previously existed. And, which area(s) benefit depends upon which index is chosen. To conclude, in the case where commodity prices are negatively correlated within geographic areas, basing a GPA on one of the commodity indexes rather than the overall index may not eliminate or reduce geographic variation in real RMC, but may in fact increase the variation. [1]

Consider a third case, Case C. Here the commodity price indexes vary together positively, but the variation in the housing price index is much larger than the variation in the food price index. [2]

CASE C

Price index	Region 1	Region 2	Region 3
Food	101	100	99
Housing	105	100	95
Overall	103	100	97

[1] In the example here, $V_o = 0$. $V_F = 4$, $V_H = 4$, but $COV(F, H) = -4$.

[2] In the example here, $V_o = 9$. $V_F = 1$, $V_H = 25$, but $COV(F, H) = 5$.

Several propositions may be made here. First, basing a GPA on either of the two indexes and making an adjustment to the proportion of RMC spent on that commodity will be a move towards full equity but will not totally eliminate the inequity. But, basing a GPA on the higher variation housing index and making an adjustment only to that portion of income spent on housing would eliminate more of the inequity than a GPA based on the food price index.[1]

The above propositions presume that the GPA based upon single commodity is made only to that portion of income spent on the commodity. Suppose, however, that a GPA based on the single commodity index is made to RMC. It is clear that such an adjustment will over-compensate individuals in higher cost areas if it is based on a single commodity index whose variation exceeds the variation in the overall price index. Thus, a GPA made to RMC and based upon the housing price index would over-correct for general price level differences. Those living in areas with high overall price levels would now have higher real income than those living in areas with lower overall price levels.

Three general rules may be stated here. First, as long as the covariation in commodity price indexes is positive, basing a GPA on one of those indexes and making an adjustment only to the proportion of RMC spent on that commodity will be a move towards full equity although full equity will not be achieved. Second, basing the GPA on a commodity whose index has a larger variation will be a greater move towards equity than a GPA based on a commodity whose index has smaller variation (again assuming the adjustment is made only to the portion of income spent on the commodity). Third, in general, commodities do not receive the same weight in the construction of the overall index. Other things equal, a greater move towards equity will be achieved if the commodity which has a larger share in the budget is selected.

An empirical question is which of these three cases fits the U.S. economy. Is the covariation in commodity price index across geographic areas positive or negative? And, if a single commodity price index is to be used, what would that best index commodity be (best in the sense that use of the commodity index would go further towards full equity than use of any alternative indexes)?

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[1]To give an example here, suppose the GPA takes the form of adjustments to incomes of those individual in region 1 and region 2 but none to those in region 3. If the housing index is used as the basis for adjustment and the adjustment is made to half of total income, region 1 would receive a 5 percent boost in income and region 2 would receive a 2.5 percent boost. If food index is used and the adjustment made to the portion of income spent on food and the adjustment would be 1 percent for region 1 and .5 percent for region 2.

To answer these questions, the Standard Family Budgets COL indexes were analyzed. While these indexes are not pure price indexes, they are highly correlated with pure price indexes and therefore are of use in answering these questions. Using the Autumn 1974 indexes, the correlations between each pair of indexes was computed at each level of living. The matrix of correlations at each level of living are presented in table 1.

As the reader may ascertain, almost all of the correlations between pairs of commodity indexes are positive. These positive correlations indicate that areas which have high prices for one commodity tend to have high prices for other commodities. There are only two cases in which correlations involving indexes other than the transportation index are negative, and neither of these is statistically significantly different from zero. [1] The fact that the commodity indexes in almost all cases are positively correlated lends credence to the view that basing a GPA on one of the individual commodity indexes and making an adjustment to the portion of income spent on the commodity will be a move towards equity.

Referring to the definition of variance in footnote 1 on page 6, the reader will note that (1) the variance of the overall index is positively related to the variance of each of the commodity indexes; and (2) those commodities with large budget shares (W_i's) will contribute more to the variance of the overall index than those with small budget shares. Table 2 presents the standard deviation (square root of the variance) of each of the commodity indexes and their respective budget shares. Inspection of this table indicates that the main contributor to the variation in the overall index is the housing index.[2] This is true (1) because the geographic variation in housing costs is substantially larger than the geographic variation in any other commodity index, and (2) because housing has a larger share in the total budget than any other commodity.

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[1] The way the transportation index was constructed in the lower and intermediate budgets lead to the negative correlations involving this index. Low cost public transportation was given a large weight in this index in large metropolitan areas. Higher cost automobile transportation was given a larger weight in smaller urban areas. This method of constructing the transportation index almost guarantees negative correlations between this and other indexes. In the upper budget, where all transportation is by automobile, there are no negative correlations.

[2] Examining the lower budget, for example, the variance of the overall index is $(5.26)^2 = 27.66$. The direct contribution to overall index variance made by the housing index is $(.191)^2\ (13.67)^2 = 6.81$. The contribution of the food index to overall variance is $(.300)^2\ (5.17)^2 = 2.40$. The housing index accounts for one fourth of the variance of the overall index and accounts for almost three times as much of the variance in the overall index as does the food index. The other commodities contribute substantially less than the food index to overall index variance.

TABLE 1

MATRIX OF CORRELATIONS: FAMILY BUDGETS COL INDEXES

	Total budget	Consump. budget	Food	Rent	Mort.	Trans.	Cloth.	Personal	Medical	Other
				Lower budget						
Total Budget	1.0	.98	.70	.86		-.002	.39	.24	.39	.32
Consumption budget		1.0	.70	.87		.04	.38	.27	.41	.33
Food			1.0	.35		-.07	.13	.22	.12	.39
Rent				1.0		.02	.34	.15	.36	.23
Mortgage										
Transportation						1.0	-.009	-.40	-.12	-.71
Clothing							1.0	.32	-.01	.08
Personal care								1.0	.25	.62
Medical care									1.0	.24
Other consumption										1.0
				Intermediate budget						
Total Budget	1.0	.96	.74	.72	.92	.10	.41	.36	.17	.54
Consumption budget		1.0	.77	.72	.94	.23	.38	.44	.24	.61
Food			1.0	.36	.64	-.03	.04	.20	-.41	.50
Rent				1.0	.64	.22	.43	.30	.42	.33
Mortgage					1.0	.16	.34	.33	.11	.46
Transportation						1.0	.21	.38	.13	.25
Clothing							1.0	.39	-.11	.27
Personal care								1.0	.22	.50
Medical care									1.0	.21
Other consumption										1.0
				Upper budget						
Total budget	1.0	.93	.74	.76	.86	.49	.45	.28	.32	.71
Consumption budget		1.0	.79	.79	.91	.62	.43	.35	.41	.57
Food			1.0	.56	.57	.51	.19	.14	.26	.35
Rent				1.0	.64	.53	.38	.40	.50	.55
Mortgage					1.0	.48	.37	.28	.24	.53
Transportation						1.0	-.04	.29	.49	.27
Clothing							1.0	.09	.08	.35
Personal care								1.0	.31	.05
Medical care									1.0	.41
Other										1.0

TABLE 2

STANDARD DEVIATIONS OF COL INDEXES AND BUDGET SHARES
OF RESPECTIVE COMMODITIES
(Autumn 1974)

	Lower Budget		Intermediate Budget		Upper Budget	
	Standard deviation	Budget share	Standard deviation	Budget share	Standard deviation	Budget share
Total budget	5.26	1.0	7.0	1.0	7.94	1.0
Consumption budget	5.11	.796	6.04	.759	6.42	.720
Food	5.17	.300	6.24	.248	6.11	.214
Housing[a]		.191		.226		.236
Rental	13.67	--	14.96	--	17.13	--
Mortgage	--	--	18.04	--	19.76	--
Transportation	9.42	.070	3.97	.081	5.12	.073
Clothing	6.89	.083	6.25	.076	5.87	.764
Medical care	9.81	.080	9.87	.022	7.07	.021
Other consumption	7.50	.045	6.76	.055	8.91	.062
Other items	--	.204	--	.241	--	.280

[a]For the purposes of this table, rental housing and owner-occupied housing were lumped together to obtain the budget share for housing. This share rises slightly with income in this table because a higher weight is given to owner-occupied housing expenditures at higher income levels.

The conclusions of the analysis here are twofold. First, given that the geographic covariance in commodity price indexes is positive, a GPA based on one of the commodity indexes would be a move towards equity as long as an adjustment is made only to the portion of income spent on the index commodity. Second, if a GPA is to be based on a single index commodity, the "best" index commodity appears to be housing. Geographic variation in housing costs appears to be the major contributor to the geographic variation in the overall price index.

There may be a more compelling reason for basing a GPA to military personnel on a housing price index. We suspect that if two separate price indexes for items other than housing were constructed for military personnel and for civilians, the index for military personnel would show less geographic variation. Military personnel and their families are provided many services on the installation free or for a nominal, geographically uniform, charge. A prime example here is medical care. As table 2 indicates, medical care has the second largest geographic variation of any item in the civilian COL indexes, but it would show very little variation in a military price index. In addition, many consumption items are purchased on the installation at geographically uniform prices. It has been pointed out to us by members of the QRMC staff that military post exchanges follow a national pricing policy for some items. These items which would go into a price index would also show little geographic variation. Our expectation, then, is that on the average there is less geographic variation in the prices paid by military personnel for non-housing items than the prices paid by civilians.

We have estimated that the variation in the housing price index accounts for approximately one fourth of the variation in the overall index. In an overall price index based upon the prices paid by military personnel, the proportion of the total variation accounted for by housing would be larger. Basing a GPA on an index of housing costs is even more appealing in the military case.

CONSTRUCTION OF HOUSING COST INDEXES FOR CONUS MILITARY INSTALLATIONS AND ALTERNATIVE VARIABLE HOUSING ALLOWANCE PLANS

This section uses the 1975 NAVFAC installation housing expenditure data to construct housing cost indexes for 118 CONUS installations, and compares housing costs with RMC and the Basic Allowance for Quarters (BAQ). Then various ways of implementing a Variable Housing Allowance (VHA) using these indexes are considered, both under the current pays and allowances system and a salary system. Cost estimates of alternative VHA plans are made.

Before discussing the construction of the housing cost indexes, the CONUS average Monthly Housing Costs (MHC) of married personnel in 12 pay grades are compared with the RMC and BAQ received by married personnel in these pay grades. Comparisons are presented for January 1975 and January 1976. Table 3 presents the data used for these comparisons. The average MHC for each rank are from the January 1975 and January 1976 NAVFAC surveys, respectively. The RMC and BAQ amounts are those in effect during January 1975 and January 1976, respectively.

The right hand column of table 3 gives the weights used to construct the weighted average officer and weighted average enlisted BAQ, MHC, and RMC for the officer and enlisted ranks shown. In addition, the all personnel average values for BAQ, MHC, and RMC are constructed by weighting the officer averages by .1362 and the enlisted averages by .8638 and adding the corresponding amounts together.[1] From table 3 it is seen that officers spent on the average, about $144 per month more than BAQ on housing in 1975 and $174 more in 1976. Enlisted personnel spent $73 more than BAQ in 1975 and $84 more in 1976. Housing costs rose more than BAQ between 1975 and 1976.

Table 4 displays the ratio of MHC to BAQ and the ratio of MHC to RMC for the ranks given in table 3. Two important facts are evident from this table. Officers have higher MHC relative to BAQ than enlisted personnel. However, enlisted personnel spend a larger proportion of their RMC on housing than officers do. The apparent paradox of these two findings is reconciled by comparing BAQ with RMC for officers and enlisted personnel -- BAQ occupies a smaller share of officer RMC than enlisted RMC. It is also clear that MHC as a proportion of RMC falls as pay grade increases.

One important question is whether the expenditures on housing, as a fraction of income, are comparable for military personnel and civilians. The "base" from which a VHA plan is implemented will depend upon judgments about what fraction of pay military personnel

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[1]The officer (enlisted personnel) weights used reflect the proportion of CONUS officers (enlisted personnel) in the six paygrades listed which are in the given pay grades. The weights used to construct the all personnel amounts reflect the proportions of officers and enlisted to all personnel in these 12 ranks.

TABLE 3

BAQ, RMC, AND MHC,
JANUARY 1975 AND JANUARY 1976

	Jan 1975 BAQ	Jan 1976 BAQ	Jan 1975 MHC	Jan 1976 MHC	Jan 1975 RMC	Jan 1976 RMC	Weights
Officer Grade							
O6	273	286	485	556	2675	2820	.0553
O5	252	265	453	502	2207	2325	.1219
O4	227	239	405	457	1825	1919	.1993
O3	206	217	343	383	1500	1581	.3550
O2	185	195	279	303	1210	1271	.1437
O1	149	157	235	258	913	959	.1248
Weighted Officer Average	210	220	354	394	1600	1685	
Enlisted Grade							
E8	182	191	288	313	1276	1341	.0244
E7	170	179	262	288	1115	1170	.0855
E6	158	166	241	258	961	1001	.1506
E5	146	154	204	218	809	850	.2258
E4	128	134	176	187	695	731	.2970
E3	111	116	163	177	561	664	.2167
Weighted Enlisted Average	138	145	200	214	797	838	
All Personnel	148	155	221	239	906	953	

TABLE 4

MHC RELATIVE TO BAQ AND RMC AND BAQ RELATIVE TO RMC,
JANUARY 1975 AND JANUARY 1976

	MHC/BAQ		MHC/RMC		BAQ/RMC
	Jan 1975	Jan 1976	Jan 1975	Jan 1976	Jan 1975[a]
Officer Grade					
O6	1.777	1.944	.181	.197	.102
O5	1.798	1.894	.205	.216	.114
O4	1.784	1.912	.222	.238	.124
O3	1.665	1.765	.228	.242	.137
O2	1.508	1.554	.231	.238	.153
O1	1.577	1.643	.257	.269	.163
Weighted Officer Average	1.685	1.791	.221	.234	.131
Enlisted Grade					
E8	1.555	1.639	.222	.233	.143
E7	1.541	1.609	.235	.246	.152
E6	1.525	1.554	.251	.256	.164
E5	1.397	1.416	.252	.256	.180
E4	1.375	1.396	.253	.256	.184
E3	1.468	1.526	.291	.266	.198
Weighted Enlisted Average	1.449	1.476	.251	.256	.173
All Personnel	1.493	1.541	.244	.250	.162

[a]Share of BAQ in RMC unchanged between 1975 and 1976.

can reasonably be expected to spend housing, and such a fraction would presumably be derived by examining the housing expenditures of "comparable" groups of civilians.

The 1970 Census provides estimates of the ratio of housing costs to income for homeowners, while a 1973 Census survey provides estimates of the ratio of rental expenditures to income. Table 5 shows the 1970 Census findings for homeowners while table 6 shows the findings for renters. While the bounds on the income classes are not the same in tables 5 and 6, a comparison of income classes where the bounds overlap indicates that homeowners spend a slightly higher fraction of income on housing than do renters. Generally speaking, the difference appears to be less than 1 percent in the lower income classes, but is somewhat larger (1-2 percent) in the higher income classes.

Table 7 summarizes the data in tables 4, 5, and 6. Military personnel are compared with comparable income classes of civilians in this table. The data in table 7 seem to imply that military personnel spend more on housing than comparable income classes. Such a finding might be expected. To the extent that military personnel are moved more frequently than civilians, and are unable to lock themselves into long-term fixed mortgage payments (or rental contracts) while civilians are, this finding has a great deal of logical appeal.

We must caution, however, that these comparisons may overstate the difference. RMC will understate family income for military families in which the wife works or the military member has a second job. Therefore the MHC/RMC ratio will be overstated in comparison with civilian ratios, which are based on total family income. To the extent that military personnel receive services in-kind which civilians must pay for (e.g., medical services), omission of such items from the military income measure may also bias upward the military housing cost-income ratio in comparison with that of civilians.[1]

Our somewhat inconclusive conclusion is that military personnel appear to spend a larger fraction of income on housing than comparable groups of civilians, but that the comparisons presented in table 7 overstate the true difference. Since full military income data are unavailable for military families, we are unable to compute the MHC/income ratio for military personnel that allows for an unbiased comparison with civilians.

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[1] Numbers calculated by the QRMC subsequent to the writing of this report provide evidence that RMC significantly understates total military family income. The QRMC examined a sample of 1974 tax returns of married military personnel. Using the ranks and weights in table 3, it was estimated that for 1974 RMC understated the family income of officers by 14 percent and the family income of enlisted personnel by 27 percent. (The sample included personnel stationed overseas as well as in CONUS, so these percentages should be treated with some caution.)

TABLE 5

SELECTED HOUSING COSTS AS A PERCENT OF INCOME, HOMEOWNERS[a]

Income Class	Percent
2,000 - 3,999	45
4,000 - 5,999	31
6,000 - 7,999	24
8,000 - 9,999	20
10,000 - 12,499	18
12,500 - 14,999	16
15,000 - 19,999	14
20,000 - 24,999	13
25,000 and over	11

[a]Selected Housing Costs = mortgage payments + utilities + insurance + real estate taxes.

Source: Reference 8.

TABLE 6

RENTAL EXPENDITURES AS A PERCENT OF INCOME[a]

Income Class	Percent
3,000 - 4,999	32.4
5,000 - 6,999	24.4
7,000 - 9,999	19.5
10,000 - 14,999	15.3
15,000 - 24,999	11.3
25,000 and over	9.6

[a]Rental expenditures include utilities payments.

Source: Reference 9.

TABLE 7

MONTHLY HOUSING COSTS AS A PERCENT OF INCOME, MILITARY PERSONNEL AND COMPARABLE INCOME CLASSES OF CIVILIANS

Rank	Military Personnel	Civilians	
	MHC[a] / RMC	Rental Percent	Homeowner Percent
06	.181	9.6	11
05	.205	9.6	11
04	.222	11.3	13
03	.228	11.3	14
02	.231	15.3	16
01	.257	15.3	18
All Officers	.221	11.3	14
E8	.222	11.3	14
E7	.235	15.3	16
E6	.251	15.3	18
E5	.252	19.5	20
E4	.253	19.5	20
E3	.291	24.4	24
All Enlisted	.251	19.5	20
All Personnel	.244	15.3	18

[a]January 1975 MHC/RMC.

CONSTRUCTION OF THE HOUSING COST INDEXES

Using the ranks and the weights in table 3, we constructed the average MHC of officers and enlisted personnel at 118 CONUS installations.[1] Then, we constructed an all personnel MHC at each installation by weighting the officer and enlisted MHC by the fractions .1362 and .8638, respectively. Then, an index of housing costs (HCI) for each installation was constructed for all personnel, officers, and enlisted personnel by dividing the respective MHC by the CONUS average of the respective group. Table 8 reports the results for all personnel while tables 9 and 10 report the results for officers and enlisted personnel. These tables rank the 118 installations by MHC from highest to lowest and, in addition, provide the following information: (1) the fraction of personnel who are at the given installation, (2) the cumulative fraction of personnel with MHC equal to or greater than that at the given installation, (3) the MHC/BAQ ratio and (4) the MHC/RMC ratio.

Our procedure for constructing the MHC for officers, enlisted personnel, and all personnel respectively, which uses constant weights in constructing MHC at different installations, has two virtues. First, since constant weights are used, the only source of variation from installation to installation will be variation in housing costs. If variable weights were used (where the weights reflect the actual force distribution at each installation), the weights themselves would be an added source of variation and therefore would make inferences from the computed numbers less meaningful. Second, the by-paygrade MHCs are in many cases based upon sample sizes which are rather small. The problem here is that the smaller is the sample size on which MHC is based, the larger will be the variation in the estimate of that rank's MHC and the less efficient MHC will be as a measure of the "true" mean housing cost for that rank. In constructing an overall MHC for each installation, our weighting scheme eliminates much of the random variation in the by-rank MHCs by placing the largest weights on ranks in which MHC is based upon large sample size (e.g., 03 and E6). Since the variation in MHC due to random sampling will be smaller in these grades, this weighting scheme eliminates much of the random variation in MHC and gives one more confidence that the differences in MHC across installations are based upon true differences in housing costs rather than sampling variation.

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[1] The average expenditure within pay grades on all types of housing rather than just owner-occupied or rental housing was used in order to maximize the number of installations for which housing cost indexes could be constructed. Had indexes been constructed using only renter data, say, the indexes could have been based only on the expenditures of individuals in several enlisted (E4, E5, and E6) pay grades and several officer grades (01, 02, and 03). This is because at many installations renters (or homeowners) were not surveyed in many pay grades. To obtain indexes which used all the sample data the indexes by necessity had to be based on expenditures on all types of housing.

TABLE 8

RANKING OF INSTALLATIONS BY ALL PERSONNEL MHC

Installation	MHC[a]	PPI[b]	CPP[c]	MHC[d] Index	MHC[e] / BAQ	MHC[f] / RMC
BOSTON MA	267	0,0005	0,0005	1,2126	1.8061	0,2943
WAR-PHI PA	265	0,0013	0,0018	1,2065	1.7970	0,2928
LA AFS CA	265	0,0012	0,0030	1,2060	1.7963	0,2927
NEW YOR NY	265	0,0020	0,0050	1,2033	1.7922	0,2920
BOL-WAS DC	265	0,0069	0,0119	1,2028	1.7916	0,2919
HOMESTE FL	262	0,0047	0,0167	1,1893	1.7715	0,2887
HANSCOM MA	261	0,0016	0,0183	1,1879	1.7694	0,2883
ANDREWS MD	259	0,0067	0,0251	1,1757	1.7512	0,2854
BAYONNE NJ	258	0,0006	0,0256	1,1747	1.7497	0,2851
WASH DC DC	256	0,0145	0,0401	1,1654	1.7359	0,2829
MIL DIS DC	254	0,0112	0,0513	1,1544	1.7194	0,2802
SANFRAN CA	252	0,0305	0,0818	1,1458	1.7067	0,2781
FT BELV VA	249	0,0063	0,0881	1,1314	1.6853	0,2746
PEASE NH	248	0,0037	0,0918	1,1269	1.6786	0,2735
EL TORO CA	246	0,0091	0,1009	1,1165	1.6631	0,2710
LOWRY CO	245	0,0091	0,1100	1,1122	1.6567	0,2700
LAKEHUR NJ	243	0,0016	0,1116	1,1045	1.6452	0,2681
FT MONM NJ	243	0,0033	0,1149	1,1024	1.6421	0,2676
PHILADE PA	241	0,0070	0,1219	1,0968	1.6337	0,2662
SCHENEC NY	241	0,0014	0,1232	1,0956	1.6319	0,2659
FITZSAH CO	240	0,0018	0,1251	1,0922	1.6268	0,2651
FT DETR MD	240	0,0006	0,1256	1,0916	1.6259	0,2649
NEW LON CN	239	0,0106	0,1363	1,0851	1.6163	0,2634
PATRICK FL	239	0,0030	0,1393	1,0846	1.6155	0,2633
WREEDAH DC	238	0,0035	0,1428	1,0809	1.6100	0,2624
KIRKLAN NM	237	0,0037	0,1464	1,0795	1.6079	0,2620
CLEVELA OH	237	0,0002	0,1467	1,0768	1.6039	0,2614
NEW BRU ME	236	0,0030	0,1497	1,0730	1.5983	0,2604
SANDIEG CA	236	0,0919	0,2417	1,0712	1.5956	0,2600
FT JACK SC	235	0,0150	0,2566	1,0693	1.5928	0,2595
FT SHER IL	235	0,0015	0,2581	1,0667	1.5889	0,2589
FT ORD CA	234	0,0187	0,2768	1,0637	1.5844	0,2582
FT MCPH GA	233	0,0017	0,2785	1,0613	1.5809	0,2576
OFFUTAB NB	233	0,0101	0,2886	1,0607	1.5799	0,2574
DALLAS TX	233	0,0009	0,2896	1,0583	1.5763	0,2569
FT MEAD MD	232	0,0114	0,3010	1,0554	1.5720	0,2562
PORTSMO NH	232	0,0008	0,3017	1,0551	1.5716	0,2561
ORLANDO FL	232	0,0115	0,3132	1,0535	1.5691	0,2557
MCDILL FL	231	0,0056	0,3188	1,0496	1.5634	0,2548
CECIL F FL	230	0,0064	0,3251	1,0457	1.5576	0,2538
DXRIVER MD	229	0,0037	0,3288	1,0412	1.5508	0,2527
CARLISL PA	229	0,0005	0,3294	1,0399	1.5489	0,2524
JAXVILL FL	229	0,0073	0,3367	1,0396	1.5485	0,2523
NORFOLK VA	229	0,0801	0,4168	1,0391	1.5477	0,2522
FT DIX NJ	228	0,0090	0,4258	1,0378	1.5458	0,2519
PORTLAN OR	227	0,0005	0,4263	1,0328	1.5384	0,2507
USARTKC MI	226	0,0015	0,4278	1,0284	1.5317	0,2496
LACKLAN TX	225	0,0176	0,4454	1,0237	1.5248	0,2485
KANSASC MO	224	0,0007	0,4462	1,0182	1.5166	0,2471
POPE AB NC	224	0,0033	0,4495	1,0179	1.5161	0,2471
GEORGAB CA	223	0,0046	0,4541	1,0130	1.5089	0,2459
CASTLAB CA	222	0,0050	0,4591	1,0113	1.5064	0,2455
ROCKISL IO	222	0,0002	0,4593	1,0099	1.5043	0,2451
FT DEVE MA	222	0,0059	0,4653	1,0097	1.5040	0,2451
GRANFOR ND	222	0,0050	0,4703	1,0084	1.5020	0,2448
CHARLES SC	222	0,0186	0,4889	1,0078	1.5011	0,2446
SEATTLE WA	221	0,0013	0,4902	1,0063	1.4988	0,2442
FT LEE VA	221	0,0059	0,4961	1,0056	1.4979	0,2441
EGLINAB FL	220	0,0106	0,5067	0,9979	1.4864	0,2422
FT BRAG NC	217	0,0350	0,5417	0,9884	1.4722	0,2399
NEWPORT RI	217	0,0041	0,5457	0,9873	1.4706	0,2396

TABLE 8 (Cont'd)

Installation	MHC[a]	PPI[b]	CPP[c]	MHC[d] Index	MHC/BAQ[e]	MHC/RMC[f]
RICKEAB OH	216	0,0027	0,5484	0,9817	1.4623	0,2383
FT EUST VA	216	0,0074	0,5559	0,9808	1.4608	0,2380
SCOTT IL	215	0,0040	0,5599	0,9753	1.4528	0,2367
GRIFFIS NY	214	0,0041	0,5640	0,9746	1.4517	0,2366
MCCHORD WA	214	0,0046	0,5686	0,9726	1.4488	0,2361
PENSACO FL	213	0,0096	0,5782	0,9700	1.4449	0,2354
FT CARS CO	210	0,0193	0,5975	0,9543	1.4214	0,2316
FT SAMH TX	209	0,0088	0,6064	0,9523	1.4184	0,2311
FT GORD GA	208	0,0148	0,6211	0,9441	1.4063	0,2292
ST LOUI MO	207	0,0009	0,6220	0,9428	1.4042	0,2288
HILL AB UT	207	0,0032	0,6252	0,9397	1.3997	0,2281
MCCONAB KA	206	0,0038	0,6290	0,9381	1.3972	0,2277
FT CAMP KY	206	0,0191	0,6481	0,9365	1.3949	0,2273
LITRKAB AK	206	0,0062	0,6542	0,9362	1.3945	0,2272
NEW ORL LA	205	0,0020	0,6562	0,9302	1.3856	0,2258
OAKDALE PA	204	0,0002	0,6564	0,9284	1.3828	0,2253
FT HARR IN	203	0,0036	0,6601	0,9223	1.3738	0,2239
LEMOORE CA	203	0,0059	0,6659	0,9212	1.3721	0,2236
BREMERT WA	202	0,0047	0,6706	0,9191	1.3691	0,2231
FT LEWI WA	202	0,0219	0,6925	0,9188	1.3686	0,2230
FT HUAC AR	202	0,0048	0,6974	0,9181	1.3675	0,2228
FT MONR VA	202	0,0012	0,6986	0,9180	1.3674	0,2228
WARREN WY	201	0,0037	0,7023	0,9158	1.3641	0,2223
FT HOOD TX	200	0,0404	0,7427	0,9105	1.3561	0,2210
KESSLAB MS	200	0,0139	0,7566	0,9098	1.3552	0,2208
BEALEAB CA	200	0,0047	0,7613	0,9093	1.3545	0,2207
TINKER OK	199	0,0036	0,7648	0,9056	1.3489	0,2196
WHIDISL WA	199	0,0052	0,7701	0,9052	1.3483	0,2197
GULFPOR MS	198	0,0049	0,7749	0,8982	1.3379	0,2180
CANNON NM	197	0,0044	0,7793	0,8971	1.3362	0,2177
VANDENB CA	197	0,0046	0,7840	0,8935	1.3309	0,2169
CHERRYP NC	196	0,0091	0,7930	0,8931	1.3303	0,2168
GRISSOM IN	196	0,0027	0,7957	0,8931	1.3302	0,2168
ENGLAND LA	195	0,0029	0,7986	0,8872	1.3215	0,2153
CAMPLEJ NC	195	0,0314	0,8300	0,8869	1.3210	0,2153
MALMSTR MT	195	0,0048	0,8348	0,8857	1.3193	0,2150
EDWARDS CA	195	0,0035	0,8383	0,8854	1.3189	0,2149
WURTSMI MI	195	0,0033	0,8416	0,8844	1.3173	0,2146
CHASE F TX	194	0,0016	0,8432	0,8838	1.3165	0,2145
TWNINEP CA	193	0,0035	0,8467	0,8758	1.3045	0,2126
FT BENN GA	192	0,0157	0,8625	0,8736	1.3012	0,2120
FT LEAV KA	192	0,0029	0,8654	0,8730	1.3003	0,2119
ABERDEE MD	191	0,0054	0,8708	0,8662	1.2903	0,2102
CHANUTE IL	190	0,0098	0,8806	0,8617	1.2835	0,2091
MERIDIA MS	190	0,0030	0,8836	0,8615	1.2831	0,2091
KINGSVL TX	189	0,0019	0,8855	0,8601	1.2811	0,2086
MEMPHIS TN	187	0,0095	0,8950	0,8513	1.2680	0,2066
FT BLIS TX	186	0,0126	0,9075	0,8476	1.2625	0,2057
USAMISC AL	186	0,0037	0,9112	0,8458	1.2599	0,2053
FT RILE KA	186	0,0154	0,9266	0,8443	1.2576	0,2049
FT KNOX KY	185	0,0184	0,9450	0,8407	1.2522	0,2040
CRAIGAB AL	181	0,0019	0,9469	0,8209	1.2228	0,1993
FT RUCK AL	179	0,0055	0,9524	0,8114	1.2086	0,1969
FT SILL OK	178	0,0149	0,9673	0,8090	1.2050	0,1964
ALTUS OK	176	0,0042	0,9715	0,7993	1.1906	0,1940
FT WOOD MO	169	0,0121	0,9836	0,7659	1.1409	0,1859
FT POLK LA	165	0,0164	1,0000	0,7508	1.1183	0,1822

[a]MHC = Monthly Housing Cost

[b]PPI = Percent of Personnel at Installation

[c]CPP = Cumulative Percent of Personnel

[d]MHC Index = Installation MHC divided by national average MHC

[e]MHC/BAQ = Ratio of MHC to (monthly) BAQ

[f]MHC/RMC = Ratio of MHC to (monthly) RMC.

TABLE 9

RANKING OF INSTALLATIONS BY OFFICER MHC

Installation	MHC	PPI	CPP	MHC Index	MHC/BAQ	MHC/RMC
NEW YOR NY	456	0.0027	0.0027	1.3021	2.1743	0.2847
WAR-PHI PA	449	0.0018	0.0045	1.2837	2.1435	0.2806
BOSTON MA	438	0.0015	0.0060	1.2510	2.0890	0.2735
BAYONNE NJ	434	0.0009	0.0069	1.2403	2.0712	0.2712
HANSCOM MA	430	0.0064	0.0133	1.2272	2.0493	0.2683
BOL-WAS DC	427	0.0273	0.0406	1.2206	2.0382	0.2668
MIL DIS DC	413	0.0404	0.0810	1.1801	1.9705	0.2580
WASH DC DC	410	0.0470	0.1279	1.1718	1.9567	0.2562
LAKEHUR NJ	408	0.0011	0.1291	1.1668	1.9484	0.2551
ANDREWS MD	407	0.0110	0.1401	1.1618	1.9401	0.2540
PORTSNO NH	403	0.0009	0.1410	1.1508	1.9216	0.2516
EL TORO CA	402	0.0074	0.1484	1.1476	1.9162	0.2509
CLEVELA OH	401	0.0003	0.1487	1.1452	1.9124	0.2504
SANDIEG CA	400	0.0575	0.2062	1.1437	1.9097	0.2500
LA AFS CA	396	0.0065	0.2128	1.1313	1.8892	0.2473
WREEDAH DC	391	0.0090	0.2218	1.1171	1.8653	0.2442
PHILADE PA	391	0.0075	0.2293	1.1160	1.8636	0.2440
HOMESTE FL	389	0.0032	0.2326	1.1121	1.8570	0.2431
FT MONM NJ	388	0.0040	0.2366	1.1084	1.8508	0.2423
SANFRAN CA	387	0.0227	0.2593	1.1071	1.8487	0.2420
FT BELV VA	387	0.0059	0.2652	1.1062	1.8472	0.2418
JAXVILL FL	387	0.0084	0.2736	1.1059	1.8467	0.2418
DXRIVER MD	386	0.0046	0.2782	1.1039	1.8433	0.2413
FT ORD CA	384	0.0124	0.2906	1.0976	1.8328	0.2400
NEW LON CN	384	0.0082	0.2988	1.0974	1.8325	0.2399
CECIL F FL	381	0.0054	0.3042	1.0877	1.8163	0.2378
PEASE NH	379	0.0038	0.3080	1.0829	1.8082	0.2367
MCDILL FL	374	0.0062	0.3141	1.0695	1.7859	0.2338
NORFOLK VA	374	0.0587	0.3729	1.0683	1.7839	0.2336
NEW BRU ME	373	0.0041	0.3769	1.0657	1.7796	0.2330
PATRICK FL	372	0.0043	0.3813	1.0620	1.7733	0.2322
DALLAS TX	371	0.0006	0.3819	1.0603	1.7705	0.2318
EGLINAB FL	371	0.0130	0.3949	1.0591	1.7685	0.2315
SCHENEC NY	370	0.0008	0.3956	1.0583	1.7673	0.2314
CHARLES SC	370	0.0125	0.4081	1.0574	1.7656	0.2312
FT MEAD MD	368	0.0152	0.4234	1.0502	1.7537	0.2296
FT DETR MD	365	0.0011	0.4245	1.0437	1.7428	0.2282
LOWRY CO	365	0.0063	0.4308	1.0423	1.7405	0.2279
FT DEVE MA	365	0.0056	0.4364	1.0416	1.7393	0.2277
ORLANDO FL	363	0.0024	0.4388	1.0373	1.7321	0.2268
FT MCPH GA	361	0.0045	0.4433	1.0302	1.7203	0.2252
FT DIX NJ	360	0.0064	0.4497	1.0293	1.7188	0.2250
FT SHER IL	358	0.0028	0.4525	1.0222	1.7069	0.2235
OFFUTAB NB	357	0.0203	0.4728	1.0211	1.7051	0.2232
USARTKC MI	357	0.0026	0.4754	1.0197	1.7027	0.2229
FITZSAH CO	357	0.0045	0.4798	1.0196	1.7027	0.2229
OAKDALE PA	354	0.0006	0.4805	1.0120	1.6898	0.2212
GEORGAB CA	351	0.0040	0.4844	1.0031	1.6750	0.2193
FT SAMH TX	348	0.0161	0.5005	0.9938	1.6595	0.2173
FT CARS CO	347	0.0110	0.5115	0.9917	1.6561	0.2168
KANSASC MO	346	0.0008	0.5123	0.9889	1.6513	0.2162
CANNON NM	345	0.0029	0.5152	0.9858	1.6462	0.2155
NEWPORT RI	345	0.0110	0.5262	0.9844	1.6438	0.2152
RICKEAB OH	344	0.0026	0.5289	0.9822	1.6401	0.2147
CHERRYP NC	343	0.0063	0.5351	0.9805	1.6373	0.2144
FT LEE VA	343	0.0100	0.5451	0.9803	1.6369	0.2143
ST LOUI MO	343	0.0028	0.5478	0.9796	1.6357	0.2142
FT JACK SC	342	0.0047	0.5526	0.9768	1.6311	0.2135
PENSACO FL	341	0.0172	0.5697	0.9755	1.6290	0.2133
CASTLAB CA	341	0.0046	0.5743	0.9737	1.6260	0.2129
SCOTT IL	339	0.0091	0.5834	0.9696	1.6191	0.2120

TABLE 9 (Cont'd)

Installation	MHC	PPI	CPP	MHC Index	MHC / BAQ	MHC / RMC
FT BRAG NC	339	0.0280	0.6113	0.9692	1.6185	0.2119
BEALEAB CA	339	0.0045	0.6158	0.9689	1.6178	0.2116
CHASE F TX	338	0.0026	0.6184	0.9647	1.6108	0.2109
LITRKAB AK	337	0.0073	0.6257	0.9640	1.6097	0.2107
NEW ORL LA	337	0.0030	0.6287	0.9629	1.6079	0.2105
CARLISL PA	332	0.0026	0.6313	0.9499	1.5862	0.2077
LACKLAN TX	332	0.0104	0.6417	0.9498	1.5860	0.2076
PORTLAN OR	332	0.0003	0.6420	0.9478	1.5827	0.2072
POPE AB NC	332	0.0037	0.6457	0.9472	1.5817	0.2071
WHIDISL WA	331	0.0057	0.6515	0.9468	1.5810	0.2070
ROCKISL IO	331	0.0013	0.6527	0.9458	1.5794	0.2068
GRIFFIS NY	329	0.0051	0.6579	0.9407	1.5708	0.2057
GRANFOR ND	328	0.0061	0.6640	0.9365	1.5639	0.2047
SEATTLE WA	327	0.0012	0.6652	0.9352	1.5617	0.2045
MERIDIA MS	325	0.0026	0.6678	0.9277	1.5492	0.2028
ENGLAND LA	324	0.0020	0.6698	0.9265	1.5472	0.2026
CAMPLEJ NC	323	0.0162	0.6859	0.9227	1.5408	0.2017
KIRKLAN NM	322	0.0081	0.6940	0.9202	1.5366	0.2012
MCCONAB KA	322	0.0044	0.6985	0.9190	1.5345	0.2009
KESSLAB MS	319	0.0090	0.7075	0.9123	1.5234	0.1995
FT HARR IN	317	0.0052	0.7127	0.9069	1.5144	0.1983
MCCHORD WA	317	0.0044	0.7171	0.9063	1.5133	0.1981
FT KNOX KY	317	0.0187	0.7358	0.9062	1.5133	0.1981
MEMPHIS TN	317	0.0035	0.7393	0.9051	1.5114	0.1979
FT EUST VA	317	0.0068	0.7461	0.9045	1.5103	0.1977
FT LEAV KA	316	0.0130	0.7591	0.9041	1.5097	0.1977
HILL AB UT	315	0.0045	0.7636	0.8995	1.5021	0.1967
LEMOORE CA	314	0.0047	0.7683	0.8962	1.4965	0.1959
FT LEWI WA	313	0.0183	0.7867	0.8946	1.4939	0.1956
WURTSMI MI	313	0.0031	0.7898	0.8940	1.4928	0.1954
BREMERT WA	311	0.0032	0.7930	0.8892	1.4848	0.1944
TINKER OK	311	0.0044	0.7974	0.8887	1.4839	0.1943
FT MONR VA	310	0.0046	0.8020	0.8865	1.4803	0.1938
CRAIGAB AL	309	0.0054	0.8074	0.8841	1.4762	0.1933
VANDENB CA	309	0.0053	0.8127	0.8840	1.4761	0.1933
ABERDEE MD	309	0.0074	0.8201	0.8833	1.4750	0.1931
EDWARDS CA	309	0.0044	0.8246	0.8823	1.4734	0.1929
GULFPOR MS	308	0.0013	0.8258	0.8794	1.4685	0.1923
KINGSVL TX	308	0.0029	0.8287	0.8789	1.4676	0.1921
FT BENN GA	308	0.0202	0.8489	0.8786	1.4671	0.1921
FT RILE KA	304	0.0132	0.8621	0.8696	1.4521	0.1901
FT HOOD TX	304	0.0264	0.8885	0.8692	1.4515	0.1900
TWNINEP CA	304	0.0019	0.8904	0.8690	1.4511	0.1900
WARREN WY	304	0.0048	0.8952	0.8686	1.4504	0.1899
FT BLIS TX	303	0.0138	0.9090	0.8667	1.4472	0.1895
FT GORD GA	303	0.0096	0.9186	0.8666	1.4470	0.1894
ALTUS OK	303	0.0040	0.9226	0.8653	1.4450	0.1892
GRISSOM IN	296	0.0033	0.9259	0.8466	1.4136	0.1851
MALMSTR MT	295	0.0061	0.9320	0.8436	1.4086	0.1844
FT RUCK AL	293	0.0117	0.9437	0.8365	1.3968	0.1829
USAMISC AL	291	0.0048	0.9485	0.8305	1.3868	0.1816
FT CAMP KY	291	0.0153	0.9638	0.8301	1.3862	0.1815
CHANUTE IL	290	0.0034	0.9672	0.8298	1.3856	0.1814
FT HUAC AR	290	0.0074	0.9746	0.8287	1.3838	0.1812
FT WOOD MO	279	0.0051	0.9797	0.7978	1.3322	0.1744
FT SILL OK	274	0.0159	0.9956	0.7833	1.3080	0.1712
FT POLK LA	236	0.0044	1.0000	0.6745	1.1264	0.1475

TABLE 10

RANKING OF INSTALLATIONS BY ENLISTED MHC

Installation	MHC	PPI	CPP	MHC Index	MHC / BAQ	MHC / RMC
LA AFS CA	245	0.0004	0.0004	1.2236	1.7739	0.3071
HOMESTE FL	242	0.0050	0.0054	1.2077	1.7509	0.3031
BOSTON MA	240	0.0004	0.0057	1.1989	1.7382	0.3009
BOL-WAS DC	239	0.0038	0.0095	1.1949	1.7324	0.2999
WAR-PHI PA	236	0.0012	0.0107	1.1822	1.7139	0.2967
ANDREWS MD	235	0.0061	0.0168	1.1766	1.7058	0.2953
HANSCOM MA	235	0.0009	0.0177	1.1741	1.7022	0.2947
NEW YOR NY	235	0.0019	0.0196	1.1730	1.7006	0.2944
WASH DC DC	232	0.0095	0.0291	1.1608	1.6829	0.2913
SANFRAN CA	231	0.0317	0.0608	1.1536	1.6725	0.2895
BAYONNE NJ	231	0.0005	0.0613	1.1536	1.6725	0.2895
MIL DIS DC	229	0.0067	0.0680	1.1444	1.6591	0.2872
PEASE NH	227	0.0036	0.0716	1.1363	1.6474	0.2852
FT BELV VA	227	0.0064	0.0780	1.1356	1.6463	0.2850
LOWRY CO	226	0.0095	0.0875	1.1288	1.6365	0.2833
KIRKLAN NM	224	0.0030	0.0905	1.1207	1.6249	0.2813
FITZSAH CO	222	0.0014	0.0919	1.1095	1.6086	0.2785
EL TORO CA	221	0.0094	0.1013	1.1052	1.6023	0.2774
SCHENEC NY	221	0.0014	0.1028	1.1031	1.5993	0.2769
FT DETR MD	220	0.0005	0.1033	1.1021	1.5978	0.2766
FT MONM NJ	220	0.0032	0.1065	1.0981	1.5920	0.2756
FT JACK SC	218	0.0165	0.1230	1.0922	1.5835	0.2741
PHILADE PA	218	0.0069	0.1299	1.0887	1.5785	0.2732
PATRICK FL	218	0.0028	0.1327	1.0882	1.5776	0.2731
LAKEHUR NJ	217	0.0017	0.1344	1.0846	1.5724	0.2722
NEW LON CN	216	0.0110	0.1454	1.0790	1.5643	0.2708
FT SHER IL	215	0.0013	0.1467	1.0763	1.5605	0.2701
NEW BRU ME	214	0.0029	0.1495	1.0724	1.5547	0.2691
OFFUTAB NB	214	0.0086	0.1581	1.0689	1.5497	0.2683
WREEDAH DC	214	0.0027	0.1608	1.0683	1.5488	0.2681
FT MCPH GA	213	0.0013	0.1621	1.0673	1.5474	0.2679
CARLISL PA	212	0.0002	0.1623	1.0621	1.5399	0.2666
ORLANDO FL	211	0.0129	0.1752	1.0553	1.5300	0.2649
CLEVELA OH	211	0.0002	0.1754	1.0552	1.5299	0.2648
DALLAS TX	211	0.0010	0.1764	1.0551	1.5297	0.2648
FT MEAD MD	211	0.0108	0.1872	1.0541	1.5283	0.2646
PORTLAN OR	211	0.0005	0.1877	1.0537	1.5277	0.2645
FT ORD CA	210	0.0197	0.2074	1.0517	1.5248	0.2640
SANDIEG CA	210	0.0972	0.3046	1.0486	1.5202	0.2632
LACKLAN TX	208	0.0187	0.3233	1.0415	1.5100	0.2614
MCDILL FL	208	0.0055	0.3288	1.0415	1.5100	0.2614
FT DIX NJ	208	0.0094	0.3382	1.0376	1.5043	0.2604
POPE AB NC	207	0.0032	0.3414	1.0348	1.5003	0.2597
CECIL F FL	206	0.0065	0.3479	1.0315	1.4955	0.2589
NORFOLK VA	206	0.0834	0.4313	1.0284	1.4910	0.2581
USARTKC MI	206	0.0013	0.4327	1.0282	1.4907	0.2580
PORTSMO NH	205	0.0007	0.4334	1.0261	1.4876	0.2575
GRANFOR ND	205	0.0048	0.4382	1.0257	1.4871	0.2574
ROCKISL IO	205	0.0001	0.4383	1.0251	1.4862	0.2573
KANSASC MO	205	0.0007	0.4390	1.0237	1.4842	0.2569
SEATTLE WA	205	0.0013	0.4403	1.0234	1.4837	0.2568
DXRIVER MD	204	0.0036	0.4439	1.0213	1.4806	0.2563
CASTLAB CA	204	0.0051	0.4490	1.0192	1.4777	0.2558
JAXVILL FL	204	0.0072	0.4562	1.0187	1.4769	0.2557
GEORGAB CA	203	0.0047	0.4609	1.0133	1.4690	0.2543
FT LEE VA	202	0.0053	0.4662	1.0101	1.4644	0.2535
FT EUST VA	200	0.0075	0.4737	0.9994	1.4489	0.2508
FT DEVE MA	200	0.0060	0.4797	0.9985	1.4476	0.2506
CHARLES SC	198	0.0195	0.4992	0.9916	1.4376	0.2489
FT BRAG NC	198	0.0360	0.5353	0.9912	1.4371	0.2488
MCCHORD WA	198	0.0047	0.5399	0.9885	1.4332	0.2481

TABLE 10 (Cont'd)

Installation	MHC	PPI	CPP	MHC Index	MHC / BAQ	MHC - / RMC
NEWPORT RI	197	0,0030	0,5429	0,9856	1.4290	0,2474
GRIFFIS NY	196	0,0039	0,5469	0,9816	1.4231	0,2464
RICKEAB OH	196	0,0027	0,5496	0,9792	1.4196	0,2457
EGLINAB FL	196	0,0102	0,5598	0,9786	1.4187	0,2456
SCOTT IL	195	0,0032	0,5631	0,9745	1.4128	0,2446
PENSACO FL	193	0,0084	0,5715	0,9661	1.4006	0,2425
FT CAMP KY	193	0,0197	0,5912	0,9635	1.3969	0,2418
FT GORD GA	193	0,0156	0,6067	0,9632	1.3964	0,2417
HILL AB UT	190	0,0029	0,6097	0,9485	1.3751	0,2380
FT CARS CO	188	0,0206	0,6303	0,9416	1.3651	0,2363
MCCONAB KA	188	0,0037	0,6340	0,9410	1.3643	0,2362
FT HUAC AR	188	0,0044	0,6384	0,9405	1.3635	0,2360
FT SAMH TX	188	0,0077	0,6462	0,9384	1.3605	0,2355
ST LOUI MO	186	0,0006	0,6467	0,9303	1.3487	0,2335
WARREN WY	185	0,0035	0,6503	0,9265	1.3433	0,2325
LITRKAB AK	185	0,0060	0,6563	0,9262	1.3428	0,2325
LEMOORE CA	185	0,0060	0,6623	0,9258	1.3422	0,2323
BREMERT WA	185	0,0049	0,6672	0,9251	1.3412	0,2322
FT MONR VA	185	0,0007	0,6679	0,9244	1.3402	0,2320
FT HARR IN	185	0,0034	0,6713	0,9242	1.3400	0,2320
FT LEWI WA	185	0,0225	0,6938	0,9232	1.3385	0,2317
FT HOOD TX	184	0,0425	0,7363	0,9196	1.3332	0,2308
NEW ORL LA	184	0,0018	0,7382	0,9189	1.3322	0,2306
TINKER OK	182	0,0034	0,7416	0,9080	1.3164	0,2279
KESSLAB MS	181	0,0146	0,7562	0,9069	1.3148	0,2276
GRISSOM IN	181	0,0026	0,7588	0,9037	1.3102	0,2268
OAKDALE PA	181	0,0002	0,7590	0,9030	1.3092	0,2266
GULFPOR MS	180	0,0054	0,7645	0,9012	1.3066	0,2262
MALMSTR MT	179	0,0046	0,7691	0,8952	1.2978	0,2247
VANDENB CA	179	0,0045	0,7736	0,8939	1.2960	0,2243
WHIDISL WA	178	0,0051	0,7787	0,8914	1.2924	0,2237
BEALEAB CA	178	0,0047	0,7835	0,8906	1.2913	0,2235
EDWARDS CA	177	0,0033	0,7868	0,8841	1.2817	0,2219
WURTSMI MI	176	0,0033	0,7901	0,8795	1.2751	0,2207
TWNINEP CA	175	0,0038	0,7939	0,8755	1.2693	0,2197
CAMPLEJ NC	175	0,0338	0,8276	0,8748	1.2682	0,2195
ENGLAND LA	175	0,0030	0,8307	0,8741	1.2673	0,2194
CANNON NM	174	0,0046	0,8353	0,8704	1.2618	0,2184
FT BENN GA	174	0,0150	0,8503	0,8700	1.2614	0,2184
CHANUTE IL	174	0,0108	0,8611	0,8684	1.2589	0,2179
CHERRYP NC	173	0,0095	0,8706	0,8667	1.2566	0,2175
FT LEAV KA	172	0,0014	0,8720	0,8623	1.2501	0,2164
ABERDEE MD	172	0,0051	0,8771	0,8594	1.2459	0,2157
CHASE F TX	172	0,0015	0,8786	0,8593	1.2459	0,2157
KINGSVL TX	171	0,0017	0,8803	0,8528	1.2364	0,2140
USAMISC AL	170	0,0035	0,8838	0,8480	1.2294	0,2128
MERIDIA MS	168	0,0031	0,8869	0,8410	1.2193	0,2111
FT BLIS TX	168	0,0124	0,8992	0,8403	1.2182	0,2109
FT RILE KA	167	0,0157	0,9149	0,8352	1.2109	0,2096
MEMPHIS TN	167	0,0104	0,9253	0,8343	1.2096	0,2094
FT KNOX KY	164	0,0183	0,9437	0,8205	1.1896	0,2059
FT SILL OK	163	0,0148	0,9584	0,8140	1.1802	0,2043
FT RUCK AL	160	0,0045	0,9630	0,8025	1.1635	0,2014
CRAIGAB AL	160	0,0014	0,9644	0,8015	1.1620	0,2011
ALTUS OK	156	0,0042	0,9686	0,7791	1.1296	0,1955
FT POLK LA	154	0,0182	0,9868	0,7699	1.1162	0,1932
FT WOOD MO	151	0,0132	1.0000	0,7553	1.0950	0,1895

Examining the results in tables 8, 9, and 10, it is seen that the all personnel housing cost indexes range from .76 (Ft. Polk, La.) to 1.21 (Boston, Mass.). It may be pointed out that at every CONUS installation personnel spend more than BAQ on housing. The excess of housing costs over BAQ at different installations ranges between $26 and $246 for officers and between $13 and $107 for enlisted personnel. Clearly there is a great disparity in housing costs of personnel at different installations.

The officer indexes show more variation than the enlisted or all personnel indexes, with the officer index ranging from .67 (Ft. Polk, La.) to 1.30 (New York City). The officer and enlisted indexes are generally consistent with each other; that is, installations that have a high officer MHC also have a high enlisted MHC. The simple correlation between the two indexes is .82. Obviously there is a very high correspondence between the all personnel and enlisted indexes since the enlisted index receives a very high weight (.8638) in the construction of the all personnel index.

ALTERNATIVE VARIABLE HOUSING ALLOWANCE PLANS

This section discusses how the housing cost indexes constructed in the last section might be used to implement a variable housing allowance (VHA). In discussing how a VHA might be implemented, several issues have to be considered. First, how should installations be grouped for the pruposes of a VHA? Second, what should be the proper base for a VHA adjustment? In the current pays and allowances system policy-makers would have the choice of adjusting BAQ or some fraction of RMC whereas in a salary system the adjustment would have to be based on some fraction of salary. Third, should there be separate adjustments for officers and enlisted personnel, or, more generally, should there be a sliding adjustment factor which varies by level of RMC? This section addresses these questions, considering alternative groupings of installations and alternative VHA plans, and estimating the cost of these alternative plans.

REASONS AND CRITERIA FOR GROUPING

Consider first the question of grouping. We suggest that grouping installations into a rather small number of categories may be more desirable than making a different adjustment at each CONUS installation. There are several reasons for this suggestion. First, the data may still contain "sampling errors" which will lead to incorrect adjustments at some installations if an adjustment is made directly with the indexes constructed above. Second, a plan with a relatively small number of categories may be easier to administer. Third, and more speculatively, a plan with only a small number of possible adjustments may be more acceptable to personnel. Several criteria govern how many categories there should be , and these are considered below.

Several examples of possible sampling errors may be pointed out. Looking at table 5, the MHC for personnel at the Arminster Naval facility in North Philadelphia is $265, while the MHC for personnel at the South Philadelphia Naval facility is $241. While all of the difference here may be due to real differences in housing costs between the North and South Philadelphia housing markets, some may be due to random sampling errors. A second example is provided by installations in the Washington, D.C. metropolitan area. Most of the MHCs for the D.C. area installations are very similar except for the Walter Reed Army Hospital. This MHC ($238) is $11 below that of the next closest D.C. area ($249 for Ft. Belvoir). Again, some of the differences in MHC between the D.C. area installations may be due to random sampling. As a third example, Ft. Bragg, N.C. and Pope AFB, N.C. are contiguous installations, yet the Pope MHC ($224) is $7 higher than the Ft. Bragg MHC ($217). Again, sampling error is a possible cause of this difference. The reader may find yet other examples of disparaties in MHC between seemingly similar installations.

To eliminate, or at least reduce, the effect of these possible sampling errors, installations may be grouped into categories and adjustments made at each installation according to the category into which the installation falls. Two possible groupings suggest

themselves. One is to establish categories on the basis of absolute dollar differences in MHC, and the other is to establish categories on the basis of percent differences in MHC. If categorization is by absolute dollar differences in MHC, the number of categories will grow over time if inflation occurs and housing costs rise. If it is desired that the number of categories not increase after the implementation of the plan, a categorization based upon percentage changes in MHC is preferable.

On the assumption that a categorization procedure based on percentage changes in the MHC index is to be used, we now consider various categorization procedures. The basic issue is, how many categories there should be. Several criteria govern how many categories are preferable. First, the fewer categories there are (and, consequently, the larger the range on which each category is based), the administratively simpler the plan will be. Second, the categories should be established on the basis of what are felt to be significant real differences in MHC. Too narrow a range on the categories will result in different VHAs being paid at different installations, even though the differences in MHC are "unimportant." On the other hand, the ranges should not be so broad that installations with very dissimilar housing costs are placed in the same category. Judgments will need to be made as to what constitutes an "important" difference in housing costs. Third, the fewer the categories there are, the greater will be the likelihood that an installation falls into the category in which it "really" belongs. That is, the chance that sampling errors will result in an installation being misplaced is reduced.

These criteria suggest that the number of categories should be as small as possible consistent with judgment as to what constitutes "important" changes in housing costs. We have constructed three alternative categorizations, which are based upon 5 percent, 10 percent, and 15 percent increments in the all personnel MHC index. These three plans are presented in tables 11, 12, and 13. The tables provide the number of categories generated by each plan, the range on MHC and the MHC index in each category, and the percentage of CONUS personnel who are estimated to fall in each category.[1]

[1] The percentage of personnel in each category is actually the percentage of personnel at the 118 installations (with known HCIs) which fall into the category. The personnel at these 118 installations comprise 74 percent of the June 30, 1975 CONUS force. It is unlikely that these distributions will be altered significantly when the HCIs of all installations become available.

TABLE 11

A VHA PLAN WHERE INSTALLATIONS ARE GROUPED ON THE BASIS OF FIVE PERCENT INCREMENTS IN ALL PERSONNEL MHC INDEX

Category	MHC index	Range on MHC	Percent of personnel
1	120 & above	265 & above	1.19
2	115-119	254-269	3.94
3	110-114	243-253	6.35
4	105-109	235-242	19.83
5	100-104	221-231	18.29
6	95-99	209-220	11.03
7	90-95	199-208	16.37
8	85-89	187-198	12.49
9	80-84	178-186	7.23
10	75-79	177 & below	3.27

TABLE 12

A VHA PLAN WHERE INSTALLATIONS ARE GROUPED ON THE BASIS OF TEN PERCENT INCREMENTS IN ALL PERSONNEL MHC INDEX

Category	MHC index	Range on MHC	Percent of personnel
1	120 & above	265 & above	1.19
2	110-119	243-262	10.30
3	100-109	221-241	38.12
4	90-99	199-220	27.40
5	80-89	178-198	19.72
6	70-79	177 & below	3.27

TABLE 13

A VHA PLAN WHERE INSTALLATIONS ARE GROUPED ON THE BASIS OF FIFTEEN PERCENT INCREMENTS IN THE ALL PERSONNEL MHC INDEX

Category	MHC index	Range on MHC	Percent of personnel
1	115 & above	253 & above	5.13
2	100 - 114	221 - 252	44.48
3	85 - 99	187 - 220	39.89
4	84 & below	186 & below	10.50

Looking at the plans in tables 11, 12, and 13, the range on MHC within each of the categories is (approximately) $10 in the 5 percent increment, $20 in the 10 percent increment, and $30 in the 15 percent increment categorizations. We feel that the grouping based upon 5 percent changes in the MHC index is too narrow. There are 10 categories here and some installations are likely to be "misplaced" (i.e., be in categories other than the one in which they should truly be if MHC were known without error). In addition, only a $5 change is required, on average, to move installations from one category to another. Such small differences in monthly housing costs are too small to distinguish between.

A categorization based upon either 10 percent of 15 percent changes in the MHC index is preferable. First, the number of categories is reasonably small, 6 in the former case and 4 in the latter case. Second, the categories are sufficiently broad that the likelihood of "misplacing" installations is small. Third, categories are established on the basis of "important" changes in housing costs. That is, an installation's MHC would have to change by $10 or $15, on average, for it to move from one category to another. Smaller changes in MHC would not induce movement.

A categorization which has larger than 15 percent ranges in each category is probably too broad. There is little saving in terms of reducing the number of categories below the number based upon 15 percent increments in MHC index. More important, installations which appear to be very dissimilar in terms of MHC will be lumped together here.

The category that each CONUS installation would fall into under the 10 percent, and 15 percent increment plans is provided in appendix B. When an installation's HCI is unknown, we "estimate" the category into which it is likely to fall. By looking at the known HCIs of installations in similar geographic proximity together with information on the population density of the area. A categorization of installations under the 5 percent

increment plan is not provided because estimating the exact category that each installation with an unknown HCI would fall into is too speculative to be worth the effort. Housing cost data at the omitted installations are necessary if the 5 percent plan is selected. [1]

One policy consideration is separate treatment of officers and enlisted personnel. Using the three categorizations of installations above, which are based on the all personnel MHC index, we computed the following items separately for officers and enlisted personnel: (1) average MHC, (2) average MHC/BAQ, and (3) average MHC/RMC. [2] In addition, the frequency distributions of officers and enlisted personnel across categories in the three categorizations were tabulated. Tables 14 and 15 present these items for officers and enlisted personnel. There are significant differences in the distribution of officers and enlisted personnel across categories in the different categorizations. Larger percentages of officers are located in the higher categories (higher housing cost areas).

ALTERNATIVE VHA ADJUSTMENTS

The question of what should be adjusted is more difficult. Under the current pays and allowances system, the likely basis for implementing a VHA is BAQ. That is, a VHA could be appended to the current system by categorizing installations and establishing VHA rates such that these rates plus BAQ cover the median housing costs in each category of installations. An alternative method would be to base the VHA on some fraction of RMC (e.g., .20) rather than BAQ. In this system, installations would be categorized and the VHA in dollars would be the difference between MHC in each category and b (RMC) where b is the chosen fractional basis of RMC (e.g., .20). If a salary system rather than the current pays and allowances system were in effect, a VHA would have to be based on some fraction of salary, for in this system there would be no separate allowance such as BAQ on which to base the adjustment.

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1 Appendix C provides a listing of the CONUS installations for which no housing cost data were available.

2 We used the all personnel index to categorize installations. If the enlisted personnel and officers were categorized on the basis of their own MHC indexes, there would be cases in which a given installation would fall into different categories in the officers and enlisted categorizations. We felt that it was better to impose the restriction that officers and enlisted personnel at a given installation fall into the same category, even if, within categories, officers and enlisted personnel receive different adjustments.

TABLE 14

AVERAGE OFFICER MHC, MHC/BAQ, AND MHC/RMC
ALTERNATIVE CATEGORIZATIONS

Category	Average MHC	MHC/BAQ	MHC/RMC	Percent of personnel
		Categorization A		
1	432	2.06	.270	3.98
2	410	1.96	.256	10.89
3	386	1.84	.241	5.12
4	368	1.76	.230	11.38
5	355	1.69	.222	21.17
6	339	1.61	.211	12.43
7	319	1.51	.198	14.56
8	310	1.48	.193	10.76
9	300	1.43	.187	8.35
10	260	1.24	.162	1.35
		Categorization B		
1	432	2.06	.270	3.98
2	394	1.88	.246	16.01
3	374	1.78	.233	32.46
4	324	1.54	.202	27.01
5	308	1.47	.192	19.11
6	260	1.24	.162	1.35
		Categorization C		
1	422	2.01	.263	14.87
2	376	1.79	.235	37.58
3	319	1.52	.199	37.85
4	288	1.37	.180	9.70

TABLE 15

AVERAGE ENLISTED MHC, MHC/BAQ, AND MHC/RMC
ALTERNATIVE CATEGORIZATIONS

Category	Average MHC	MHC/BAQ	MHC/RMC	Percent of personnel
		Categorization A		
1	239	1.73	.299	.77
2	234	1.70	.293	2.87
3	224	1.62	.281	6.55
4	214	1.55	.268	14.78
5	204	1.48	.255	24.20
6	195	1.41	.244	10.79
7	184	1.33	.230	16.62
8	173	1.25	.217	12.74
9	164	1.19	.205	7.06
10	153	1.11	.192	3.56
		Categorization B		
1	239	1.73	.299	.77
2	229	1.66	.287	9.42
3	209	1.51	.262	38.93
4	190	1.37	.238	27.41
5	170	1.23	.213	19.80
6	153	1.11	.192	3.56
		Categorization C		
1	234	1.70	.293	3.64
2	211	1.53	.265	45.53
3	184	1.33	.231	40.15
4	161	1.17	.202	10.62

In the context of the current pays and allowances system, introducing the VHA using BAQ as the basis has two merits. First, there is a belief among military personnel that BAQ should cover housing costs, but in fact it does not. A system where VHA plus BAQ covers housing costs would achieve this goal. Second, under consideration by the QRMC is a policy of charging a fair market rental value for military housing. If a VHA were implemented and the "price" of military housing were BAQ plus the VHA, the goal of charging a fair market rental for such housing could be achieved.

Under the current system, basing a VHA on BAQ has the difficulty that BAQ is a rather small share of RMC, 16.2 for all personnel (see table 4). Some people have argued that there are more "housing dollars" currently being provided in RMC than are reflected in current BAQ rates. Their arguments are considered below when several VHA plans are discussed.

Another problem is the choice of the proper basis for a VHA which has to do with the question of separate treatment of officers and enlisted personnel. As may be seen from table 4, MHC/BAQ is higher for officers than enlisted personnel. However, MHC as a fraction of RMC is higher for enlisted personnel. If a plan which uses BAQ as a basis is implemented and officers and enlisted personnel each receive separate VHA adjustments based on their own BAQ rates, officers will receive a larger VHA supplement (relative to BAQ) than enlisted personnel. However, if some fraction of RMC (salary) serves as the basis, and officers and enlisted personnel each receive a VHA payment which, in percentage terms, is the percentage excess of monthly housing costs over some specified portion of RMC (salary), enlisted personnel will receive a proportionately larger VHA than officers (unless the specified fraction is lower for officers than enlisted personnel).[1]

We now present six prototype VHA plans, three of which use BAQ or some other measure of the housing dollars available in RMC as a basis, and three of which use a pre-selected fraction of RMC (.20 is assumed for illustrative purposes) as a basis. Installations are grouped into categories based on 5, 10, or 15 percent increments in the all personnel MHC index and then the required VHA adjustment factor is computed for the installations in each category. The separate adjustments that officers and enlisted personnel would receive are presented. In the following section, cost estimates of the various plans are provided.

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[1] If it is determined that the "appropriate fraction" on which to base a VHA is the fraction of income that comparable income classes of civilians spend on housing, the fraction would be set lower for officers than enlisted personnel.

Before analyzing these plans, we return to a problem mentioned above, namely that current BAQ rates may understate the total housing dollars provided in RMC. It can be argued that this is true for two reasons: (1) there is a tax advantage that accrues to the individual because of the non-taxability of BAQ, and at least some portion of this tax advantage should be counted as housing dollars, and (2) some of the 1971, 1972, and 1973 pay raises, all of which raised only Base Pay, were intended to cover rising housing costs. Table 16 shows the dollars associated with housing in January 1975 RMC under alternative assumptions as to how the tax advantage is computed and whether or not part of the 1971-73 pay raises are considered dollars associated with housing. Table 17 shows, for officers, enlisted personnel, and all personnel, respectively, the share of housing dollars in RMC under various assumptions about how these dollars should be computed. These shares will be useful in deciding what fractional portion of RMC is the fair and appropriate measure to be used under a salary system.

TABLE 16

DOLLARS IN MARRIED RMC ASSOCIATED WITH HOUSING, UNDER ALTERNATIVE ASSUMPTIONS

Rank	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
06	272.70	415.88	483.31	346.24	402.38	306.77
05	252.00	354.14	411.56	307.24	357.05	283.68
04	227.40	304.79	354.21	270.30	314.13	256.73
03	206.40	269.33	313.00	242.40	280.17	232.66
02	185.40	230.62	268.01	214.31	249.06	210.00
01	149.40	180.23	209.45	169.18	196.61	172.98
Officer Average	209.60	278.15	323.25	248.43	288.16	237.07
E8	181.80	225.95	262.58	207.09	240.67	206.40
E7	170.40	204.79	238.00	192.59	223.82	194.14
E6	158.40	189.19	219.46	175.77	204.26	181.38
E5	146.40	176.41	205.01	162.25	188.60	168.53
E4	128.10	154.93	180.05	142.13	165.17	150.24
E3	110.70	133.12	154.70	122.17	141.98	126.67
Enlisted Average	137.95	166.20	193.09	153.31	178.17	159.07
All Personnel	147.70	181.43	210.46	166.25	193.15	169.69

SOURCE: QRMC

DEFINITIONS:

HD 1 = January 1975 BAQ rates

HD 2 = HD 1 plus tax advantage computed at marginal tax rates

HD 3 = HD 2 plus adjustment to reflect what BAQ would have been if BAQ had risen at same rate as Basic Pay between 1971 and 1974

HD 4 = HD 1 plus tax advantage evaluated at average tax rates

HD 5 = HD 4 plus pay raise factor as in HD 3

HD 6 = what BAQ would have been in January 1975 had 1971 BAQ rates grown at same rate as Base Pay between 1971 and 1975 (no imputed tax advantage here)

TABLE 17

THE SHARE OF HOUSING DOLLARS IN RMC
ALTERNATIVE DEFINITIONS[a]

	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
Officer	.131	.174	.202	.155	.180	.148
Enlisted	.173	.208	.242	.192	.224	.200
All personnel	.162	.200	.232	.183	.213	.187

[a] Computed from table 16 and table 3.

Let us now present the plans based on BAQ or one of the other measures of housing dollars in RMC. For each plan and each measure of housing dollars, the VHA adjustment factor for each category of installations is (MHC - HD)/HD, where HD is the given measure of housing dollars and MHC is the average MHC for the given category. This adjustment factor when multiplied by the given measure of housing dollars, gives the VHA required to equalize housing costs and housing dollars for the given category of installations. Table 18 presents the adjustment factors under the assumption that all personnel will receive the same adjustment. These adjustment factors are based on the all personnel MHC and all personnel housing dollars. Tables 19 and 20 present separate adjustment factors for officers and enlisted personnel where the adjustment factors for each group are based on that group's MHC and that group's housing dollars.

Let us examine the plan based upon 10 percent increments in the all personnel MHC index. Assume that officers and enlisted personnel are to be treated separately. From table 19 it is seen that, using the HD 1 measure of housing dollars, officers at installations in category 1 require a VHA which is equal to 1.06 times HD 1 (January 1975 BAQ) to equalize housing costs with housing dollars. From table 20, the enlisted personnel at the category 1 installations require a VHA equal to .73 times HD 1 (January 1975 BAQ) to equalize housing costs and housing dollars. The adjustment factors for other categories and plans and measures of housing dollars may be interpreted similarly.

What measure of housing dollars is the most appropriate? While this question cannot be answered definitively, we suggest that the HD 2 or HD 4 measures yield the housing dollars that, as a proportion of RMC, are closer to the dollars that comparable civilian income classes actually spend on housing than the other measures. For example, the HD 2 measure of housing dollars is .174 percent of officer RMC and .208 percent of enlisted

TABLE 18

VHA ADJUSTMENT FACTORS FOR ALL PERSONNEL,
VARIOUS MEASURES OF HOUSING DOLLARS

Category	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
			5% Categorization			
1	.79	.46	.26	.59	.37	.54
2	.75	.43	.23	.56	.34	.50
3	.68	.37	.18	.49	.29	.44
4	.60	.31	.13	.43	.23	.38
5	.53	.25	.07	.36	.17	.32
6	.45	.18	0	.29	.11	.27
7	.38	.12	0	.23	.06	.19
8	.30	.07	0	.17	0	.13
9	.23	0	0	.09	0	.06
10	.16	0	0	0	0	0
			10% Categorization			
1	.79	.46	.26	.59	.37	.55
2	.71	.38	.19	.51	.30	.47
3	.56	.27	.10	.39	.20	.35
4	.42	.15	0	.26	.08	.22
5	.27	.04	0	.13	0	.10
6	.16	0	0	0	0	0
			15% Categorization			
1	.76	.43	.24	.56	.35	.51
2	.60	.30	.12	.42	.22	.37
3	.38	.12	0	.22	0	.18
4	.19	0	0	0	0	0

TABLE 19

VHA ADJUSTMENT FACTORS FOR OFFICERS,
VARIOUS MEASURES OF HOUSING DOLLARS

Category	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
			5% Categorization			
1	1.06	.55	.34	.74	.50	.82
2	.96	.47	.27	.65	.42	.73
3	.84	.39	.19	.55	.34	.62
4	.76	.32	.14	.48	.28	.55
5	.69	.27	.10	.43	.23	.50
6	.61	.22	.05	.36	.18	.34
7	.51	.14	0	.28	.10	.34
8	.48	.11	0	.25	.07	.31
9	.43	.08	0	.20	.04	.27
10	.24	0	0	.05	0	.10
			10% Categorization			
1	1.06	.55	.34	.74	.50	.82
2	.88	.42	.22	.59	.37	.66
3	.78	.34	.16	.50	.30	.58
4	.54	.16	0	.30	.12	.37
5	.47	.11	0	.24	.07	.30
6	.24	0	0	.05	0	.10
			15% Categorization			
1	1.01	.52	.30	.70	.70	.78
2	.79	.35	.16	.51	.30	.59
3	.52	.14	0	.28	.11	.35
4	.37	.04	0	.16	0	.22

TABLE 20

VHA ADJUSTMENT FACTORS FOR ENLISTED PERSONNEL, VARIOUS MEASURES OF HOUSING DOLLARS

Category	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
			5% Categorization			
1	.73	.44	.24	.55	.34	.50
2	.70	.41	.21	.52	.31	.47
3	.62	.35	.16	.46	.26	.41
4	.55	.29	.11	.40	.20	.35
5	.48	.23	.06	.33	.14	.28
6	.41	.17	0	.27	.10	.22
7	.33	.10	0	.20	.03	.16
8	.25	.04	0	.13	0	.09
9	.19	0	0	.07	0	.03
10	.11	0	0	0	0	0
			10% Categorization			
1	.73	.44	.23	.55	.34	.50
2	.66	.38	.19	.49	.29	.44
3	.51	.26	.08	.36	.17	.31
4	.37	.17	0	.24	.07	.19
5	.23	.02	0	.11	0	.07
6	.11	0	0	0	0	0
			15% Categorization			
1	.70	.40	.21	.53	.31	.47
2	.53	.27	.09	.38	.18	.33
3	.33	.10	0	.20	.03	.16
4	.17	0	0	.05	0	0

RMC. Civilian families with incomes comparable to the average officer RMC spend between 11.3 and 14 percent of income on housing whereas civilian families with incomes comparable to the average enlisted RMC spend between 19.5 and 20 percent of RMC on housing. The HD 2 measure of housing dollars thus gives amounts which are slightly higher than what similar civilian families spend on housing. However, RMC understates somewhat total military family income, and we suspect that if this total income could be observed, the HD 2 measure of housing dollars would be very close to what comparable civilian groups spend on housing.

The HD 1 measure of housing dollars, current BAQ rates, as a proportion of RMC is lower than what comparable civilian income groups spend on housing in spite of the fact that RMC understates military family income. We feel, therefore, that current BAQ rates are too low a base from which to implement a VHA. On the other hand, the HD 3 and HD 5 measures of housing dollars appear to overstate available housing dollars. Even if total military family income were observable, we suspect that these measures of housing dollars, as a proportion of income, would yield ratios which are higher than the share of housing in civilian family budgets. Data on total military family income would allow us to verify this hypothesis.

One more point about these prototype plans may be noted. If a plan is based on HD 1 (1974 BAQ rates) and the VHA is a non-taxable allowance, the VHA plan will equalize the after-tax dollars available for housing for personnel in different geographic areas. But, if the plan is based on one of the other, more stringent measures of housing dollars, the plan will not completely equalize after-tax housing dollars (even if the VHA is non-taxable) since some of these dollars are taxable.

Now let us turn to plans which are based on some fraction of RMC or salary rather than some measure of housing dollars. In these plans the VHA adjustment factor is defined as,

$$k_i = \frac{(MHC_i - bRMC)}{RMC}$$

where: b = base fraction
MHC_i = MHC at <u>ith</u> category of installations

The VHA adjustment factor k_i is simply the percentage excess of MHC over some base fraction of RMC (or salary in a salary system). The base fraction of RMC (or salary) is the fraction of RMC associated with housing as previously defined. The amount of VHA is simply k_i x RMC. Assuming $b = .20$, table 21 presents k_i for officers and enlisted under the 3 alternative categorizations of installations.

Under the 10% categorization plan, officers at installations in category 1 would receive a VHA equal to 7 percent of RMC, wheras enlisted personnel at the same installations would receive a VHA equal to 9.9 percent of RMC. The adjustment factors for other categories and categorizations may be interpreted similarly.

TABLE 21

RMC ADJUSTMENT FACTORS BASED ON VHA PLAN
WHOSE BASE IS 20 PERCENT OF RMC

Category	Officers	Enlisted
	5% Categorization	
1	.070	.099
2	.056	.093
3	.041	.081
4	.030	.068
5	.022	.055
6	0	.044
7	0	.030
8	0	.017
9	0	0
10	0	0
	10% Categorization	
1	.070	.099
2	.046	.087
3	.033	.062
4	0	.038
5	0	.013
6	0	0
	15% Categorization	
1	.063	.093
2	.035	.065
3	0	.031
4	0	0

The adjustment factors presented in table 21 presume that the basis for adjustment, .20 x RMC, is the same for both officers and enlisted personnel. Other adjustment factors for officers and enlisted personnel which are based on a different fraction of RMC could be easily derived. We have not presented such plans here for the sake of brevity.

In the current pays and allowances system, the VHA would probably be a tax free allowance, whereas in a salary system it could be taxable. Comparison of a VHA under the two systems is complicated slightly by the difference in tax treatment. However, we may easily derive the VHA dollars that must be paid under each system in order for the after-tax VHA dollars to be identical. Assume that RMC under the pays and allowances system is the same as salary (S) under a salary system. Assume the VHA is based upon 20 percent of either RMC or S. In addition, assume a proportional income tax rate t.[1] Define k_p, i as the VHA adjustment factor at the ith category of installations under a pays and allowances system and K_s, i as the VHA adjustment factor at the ith category under a salary system. The after-tax VHA dollars available to individuals at the ith category under each system are,

$$VHA_p, i = k_p, i\ (\text{MHC} - .20\ \text{RMC})$$

$$VHA_s, i = k_s, i\ (1 - t)\ (\text{MHC} - .2\ S)$$

Since RMC = S, k_s, i must equal $k_p, i/(1 - t)$ in order for VHA_p, i to equal VHA_s, i.

Let us give a simple example. Suppose RMC = S = \$1,000 per month. The base for the VHA is .2 RMC = .2 S = \$200 per month. Suppose also that MHC = \$250 per month, so that housing costs exceed the dollars available for housing by \$50 per month. Under a pays and allowances system, the VHA adjustment factor, k_p, i, is simply .05 RMC = \$50 per month. Under a salary system the adjustment factor k_s, i required to provide the individual with \$50 of after-tax VHA is

$$\frac{.05}{(1 - t)} \cdot S = \frac{\$50}{(1 - t)}$$

Thus, if the tax rate is .2,

$$k_s, i = \frac{\$50}{.8} = \$62.50.$$

[1] Under a progressive tax system, t would be the marginal tax rate.

The simple result, then, is that before-tax the VHA dollars that must be paid under the salary system to equal the VHA dollars paid under the pays and allowances exceed these latter dollars by a factor of (1/1 - t). These same conclusions would hold if one were constrasting a non-taxable VHA allowance with a fully taxable allowance.

COST OF ALTERNATIVE VHA PLANS

This section estimates the costs of the alternative VHA plans presented above. Before presenting these estimates, a few words must be said about the method by which a VHA plan will be implemented. The discussion here presumes that the VHA will be introduced into the current system as a separate allowance.

If the VHA becomes an additional allowance, it probably cannot be implemented in such a manner that total pays and allowances are held constant. The plan will not be implemented by giving a VHA to personnel at installations where housing costs exceed the VHA base and lowering one of the pays or allowances, say BAQ, at installations where housing costs fall below the VHA base.

If the VHA is introduced as a new allowance with other components of pay unchanged, the VHA may have a substantial budgetary impact. The budgetary impact will depend upon whether the introduction of a VHA affects the total amount of future pay raises. If the VHA is integrated into future pay raises such that the total amount of these raises is not affected then the costs estimated below will be more apparent than real.

We calculated the annual costs of alternative VHA plans. Our estimate of the annual cost of a plan based on BAQ, or HD1, is \$635 million. Plans based on other more stringent measures of housing dollars would cost less. For illustrative purposes we will walk the reader step by step through the calculation of the cost of the plan based on BAQ. The costs of other plans are derived similarly.

Table 22 provides the data used to calculate the cost of the plan based on BAQ. The first step was to calculate the CONUS average VHA adjustment factor by summing over the categories of installations, the product of the percentage of personnel in each category and the VHA adjustment factor for the category.[1] The resulting CONUS average adjustment factor was .67 for officers and .41 for enlisted personnel. The reader is reminded that these factors are based on housing costs of married personnel. We assume that in the absence of data on single personnel the adjustment factor will be the same for both. Next, for each officer-enlisted-marital status cell, average BAQ was multiplied by the average adjustment factor to give the CONUS average annual CONUS VHA per capita.

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[1] We calculated the average VHA adjustment factor under the 5%, 10%, and 15% categorizations and they were virtually the same in all three cases. Hence, the total cost of the plan will not be affected by particular categorization chosen.

TABLE 22

CALCULATION OF THE COST OF VHA PLAN
WHICH USES BAQ AS THE BASE

	Officers		Enlisted		
	Married	Single	Married	Single	
Average BAQ	$209.60	$157.70	$137.95	$ 91.97	
Average adjustment factor	.67	.67	.41	.41	
Average monthly VHA	$141	$106	$ 57	$ 38	
Average annual VHA	$1692	$1272	$684	$456	
June 30, 1975 CONUS force	232,202 Officers		1,337,128 enlisted		
World-wide % married (single)	80.1	19.1	52.6	47.4	
World-wide % drawing BAQ	67.8	53.5	75.5	9.7	
CONUS force expected to receive VHA	126,103	24,721	531,013	61,478	
Total cost	$213M +	$ 31M +	$363M +	$ 28M	= $635M

The next step was to estimate the number of married and single CONUS personnel who would receive the VHA. To do this, we needed to know the percentage of CONUS personnel who are married or single and the percent currently drawing BAQ in CONUS. These percentages were not available, but the world-wide percent married (single) and the world-wide percent drawing BAQ were and were thus used in the calculations. The number of married (single) CONUS personnel who are expected to draw a VHA was calculated by multiplying the June 30, 1975 CONUS force by 1) the percent married (single) and 2) the percent drawing BAQ. Separate calculations were of course made for officers and enlisted personnel. Finally, the total cost was computed by multiplying the average annual VHA for each of the four grade-marital status groups by the CONUS force expected to receive the VHA in each group and summing the total costs for these 4 groups.

Below are the costs of all the VHA plans. The same procedure as described above was used to derive the costs of plans based on the other measures of housing dollars (HD 2 - HD 6).

The cost of a plan whose base is 20 percent or RMC was made also. The average adjustment factor for officers under this plan is 2.1 percent while for enlisted personnel it is 4.4 percent (see table 4). The average monthly VHA for married officers is .02 ($1600) = $32 per month, while for single officers the average VHA is .02 ($1579) = $31.58 per month. The estimated monthly VHA for married enlisted personnel is .044 ($797) =

TABLE 23

COST OF ALTERNATIVE VHA PLANS

Measure of housing dollars	Cost (In millions)
HD 1	635
HD 2	321
HD 3	65
HD 4	475
HD 5	248
HD 6	441

\$35.06 and the amount for single enlisted personnel is .044 (\$776) = \$34.14. Using the number of CONUS personnel expected to receive the VHA in table 22, the estimated cost of such a plan is \$306M. With the numbers provided, the costs of VHA plans which are based on some fraction of RMC other than .2 or where the basis is different for officers and enlisted personnel could be easily calculated.

AN EVALUATION OF THE VHA CONCEPT AND SUGGESTED NEXT STEPS

As discussed above, a VHA can be integrated into the next several pay raises in such a way that it will have no real budgetary impact. Thus, the desirability of the VHA need not hinge on the matter of cost, but it does hinge on other questions.

Possible undesirable effects have been stated previously. The most frequently mentioned are that (1) personnel will perceive a movement from a high cost-of-living area to a low cost-of-living area as a cut in pay if a VHA is in effect, and (2) the VHA is unnecessary since assignment for high and low cost areas will balance out over the course of a military career.

The first objection can be overcome by making the VHA a separate component of compensation and making evident to personnel why this component of compensation exists. Personnel overseas get cost-of-living adjustments which vary from area to area, and there is no evidence that the interarea variability of the adjustment has caused discontent.

There is evidence that CONUS personnel would be willing to accept a VHA. In a recent survey (reference 7, p. C-29), 72 percent of respondents said they would be at least somewhat in favor of BAQ reflecting area housing costs.[1]

The second point that is made against a VHA is that, over the course of a military career, assignments in low-cost areas probably balance out assignments in high cost areas. Therefore, from a long-run perspective, there is really no need for a VHA. For career personnel, this argument may be true. However, for the bulk of one-term or two-term servicemen, this argument probably does not hold. And, since these personnel are the lower ranking enlisted men and officers, the need for an income supplement in the high cost areas is the greatest. Further, in some military occupational specialties, individuals are assigned only to certain installations during the course of their military careers. Therefore, for careerists, the argument that assignments in high and low cost areas will balance out over the course of a career will not hold.

Even if assignments in low and high cost areas balance out over the course of a career, a VHA may be beneficial. Currently, if personnel are to have the same standard of living, regardless of their duty station, they must save while in low cost areas in order to dissave (and therefore have the same living standard), while in the high cost areas.

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[1] However, the statement of the question (reference 7, p. A-15) did not make it clear whether the average level of total compensation was to be held constant or increased upon implementation of the variable BAQ. The proportion of personnel at least somewhat in favor of a VHA might be considerably lower if the implementation of the plan does not imply higher average compensation.

A VHA would allow personnel to balance consumption and income at each point in time, rather than forcing them to save in some periods and dissave in others.

Therefore, these arguments against a VHA can be heavily discounted. However, there are certain possible allocative effects which are uncertain. It is not known, for example, what impact a VHA would have on factors such as retention behavior and willingness to accept transfers. There may be other allocative effects of a VHA which are unknown and difficult to predict, at this point.

One possible allocative effect of a full-fledged GPA which eliminates all variation in real pay is that it might generate an interarea preference problem if personnel would, on the average, rather live in higher cost metropolitan areas than lower cost rural areas. Currently, the fact that real compensation is higher in the lower cost areas is a compensating differential which provides an inducement for personnel to go willingly to the lower cost areas. One feature of a VHA, as opposed to full-fledged overall GPA, is that it would in fact eliminate only a fraction of the interarea difference in living costs rather than the whole difference. Therefore, the VHA has a built-in mechanism which reduces any geographic preference problem which might arise.

There is one more possible allocative effect that may be foreseen. Proportionately more Army installations, especially large ones, are located in low cost rural areas, while proportionately more large Naval installations are located in high cost urban areas. If the average VHA is different across services (and it appears that this will be the case), the relative payoff to joining different services will be altered by introduction of VHA. By altering the average payoff to be derived from joining these two services, the VHA may change the ability of each service to attract new recruits. Whether this will be a serious problem cannot be determined beforehand, although we suspect the effect will be negligible.

If a VHA can be implemented in such a way that it will not have overriding undesirable allocative effects, the primary consideration in judging the desirability of the plan is one of equity. Do interarea cost-of-living differences really reflect an inequity in the military compensation system and should the government be concerned with eliminating them?

Certain arguments have been ventured which attempt to avow or disavow the existence of an equity problem. On the one hand, it is pointed out that military personnel are not free to migrate from one geographic area to another if they perceive that one income - geographic residence combination is preferable to another and, therefore, involuntary assignment to high cost-of-living areas imposes an unfair hardship on them. From this perspective, there is an equity problem.

On the other hand, some argue that, in the context of an all-volunteer force, the fact that individuals choose a military career as opposed to a civilian career means that they perceive that the monetary and non-monetary benefits from a military career will be higher than their best civilian alternative, regardless of their duty station. This view would hold that an equity problem does not exist.

Proof of the existence or non-existence of an equity problem probably cannot be established analytically. Whether there is an equity problem and whether a VHA (or GPA) should be implemented to resolve it is inherently a value judgment.

We feel that additional compensation for personnel assigned to high cost-of-living areas, such as Washington, D.C., is justified, since housing costs appear to occupy an inordinately large share of the pay of personnel in these areas, especially lower-paid personnel. This is strictly a value judgment and does not rest on any firm analytical base.

If it is decided that a GPA will be implemented, and that the GPA is to be an adjustment to RMC, we again reiterate that new data will have to be generated from price surveys in areas containing military installations. If, however, policy-makers opt for a VHA, and the NAVFAC housing cost data are to serve as the empirical base for this allowance, we strongly recommend that improvements be made in this survey. Currently, there are several difficulties inherent in the NAVFAC data which limit their validity for the purposes of a GPA. The data are not collected for other, more limited purposes, and they are not fully suitable for use as the basis for a GPA.

First, not all installations are surveyed contemporaneously. Some that were surveyed in earlier years were not surveyed in 1975. Some, although not all, installations will be surveyed in 1976. In an inflationary world, significant errors may be introduced into the ranking of installations by MHC if installations are not surveyed at the same time. Comparison of the 1975 CONUS-wide averages with the 1976 CONUS-wide averages indicates significantly higher 1976 averages in all pay grades. Contemporaneous surveys are necessary at all installations if the ranking of installations is to be valid.

Second, there are other, more basic problems. As mentioned previously, the number of observations on which average expenditures by pay grade are based is in many cases very small. In other instances, certain pay grades are not represented at all. However, attempts should be made to obtain decent sample sizes whenever possible. The problem alluded to previously is that for pay grades where MHC averages are based on small numbers of observations, the averages appear to be subject to a great deal of sampling error. While the weighting scheme employed earlier to obtain an overall installation MHC eliminates some of the variation in MHC due to sampling error, this problem can be reduced in future surveys by expanding sample sizes in the underrepresented pay grades, whenever possible.

A third problem in the survey, also alluded to previously, is that the quality and quantity of housing is not held constant. The indexes we constructed earlier were not price indexes. While economic theory suggests that the range on these constructed indexes should put a lower limit on the range of price indexes, it is clearly possible to better control for quantity and quality of housing in future surveys.

A future difficulty has to do with the incentive of personnel to overstate housing costs. Personnel will tend to overstate housing costs in the NAVFAC survey if they realize that the results form the basis for a VHA. Some way of validating the responses (e.g., checking mortgage or rental payment records) is necessary. At a minimum, a random sample of responses should be selected and validated if a mail survey is used.

An alternative data gathering methodology might be better. Rather than surveying military personnel at all, the methodology used in civilian sector price surveys might be employed. First, define a particular grade of housing (or several grades of housing) and then have a team of surveyors determine what this quality housing costs in the various areas in which military installations are located. This methodology is employed in the Family Budgets COL index survey, among others. The approach may be preferable for two reasons. First, measurement errors due to random sampling and varying quality of housing will be reduced. Second, because this method does not rely on the responses of military personnel, there would be no problem of incentive for personnel to overstate what they spend on housing.

If policy-makers choose to implement a VHA, we strongly recommend that the NAVFAC survey be repeated (with the improvements, noted above), or that data be collected by price surveys. The housing cost indexes we have constructed show what can be done with the NAVFAC or other data. But, we do not feel that, in and of themselves, they provide a sound basis for immediate implementation of a VHA. The cost of obtaining a new and more reliable data set should be minor relative to the problems which might ensue if a VHA were implemented on the basis of the possibly faulty housing cost indexes constructed in this paper.

One final problem should be mentioned. The question arises about whether bachelors (personnel without dependents) should be treated differently than married personnel. Since only scant data exist on the housing costs of bachelors, the analysis here was by necessity based on data for married personnel. While there are no data on bachelors, we suspect that if housing cost indexes for bachelors at the installations in this study were constructed, they would be very similar to the indexes constructed for married personnel. If this hypothesis is true, then a VHA for bachelors could be based on the very same VHA adjustment factors as for married personnel. In the absence of separate data for bachelors, a VHA for bachelors will have to be based on the married personnel indexes.

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APPENDIX A

NAVFAC AVERAGE MONTHLY HOUSING COSTS OF MILITARY PERSONNEL
FOR 1975 AND 1976,
BY RANK AND TYPE OF HOUSING

APPENDIX A

NAVFAC AVERAGE MONTHLY HOUSING COSTS OF MILITARY PERSONNEL FOR 1975 AND 1976, BY RANK AND TYPE OF HOUSING

		Owned Housing			
Rank	Year	House	Mobile Home	Rented Housing	Total Private Housing
09	1975			400	400
	1976	621		545	606
08	1975	439	600	500	462
	1976	528		558	534
07	1975	439	200	320	411
	1976	582	200	472	541
06	1975	498	420	406	485
	1976	567	423	485	556
05	1975	464	364	383	453
	1976	512	406	430	502
04	1975	419	318	333	405
	1976	470	357	362	457
03	1975	372	250	278	343
	1976	407	281	299	383
02	1975	320	215	238	279
	1976	349	251	252	303
01	1975	304	213	214	235
	1976	335	196	237	258
WO3	1975	337	218	297	322
	1976	376	296	320	363
WO2	1975	318	211	269	294
	1976	371	223	307	347
WO1	1975	280	208	241	365
	1976	339	233	335	326

Rank	Year	Owned Housing: House	Owned Housing: Mobile Home	Rented Housing	Total Private Housing
E9	1975	313	220	279	303
	1976	341	259	299	332
E8	1975	301	212	271	288
	1976	328	234	285	313
E7	1975	281	202	241	262
	1976	309	228	256	288
E6	1975	273	207	222	241
	1976	295	218	230	258
E5	1975	256	198	193	204
	1976	270	205	203	218
E4	1975	233	191	172	176
	1976	248	199	181	187
E3	1975	210	176	161	163
	1976	247	199	173	177

SOURCE: Naval Facilities Engineering Command, "NAVFAC Housing Costs Surveys for 1975 and 1976."

APPENDIX B

CATEGORIZATIONS OF CONUS MILITARY INSTALLATIONS UNDER THE 10 PERCENT AND 15 PERCENT PLANS

APPENDIX B

CATEGORIZATIONS OF CONUS MILITARY INSTALLATIONS UNDER THE 10 PERCENT AND 15 PERCENT PLANS

This appendix provides the categories into which each CONUS military installation in the U.S. would fall under two of the plans described in the text. The first plan was outlined in table 11 and is based on 10 percent changes in the MHC index. The second was outlined in table 12 and is based on 15 percent changes.

The 118 installations for which an MHC index was computed are, in most cases, easily categorized. The remaining installations, for which MHC indexes are not available, are starred. The category into which each of these installations is likely to fall is determined by using the category of installations in close geographic proximity. When an installation is located in rural area and the closest installation for which a MHC is available is located in an urban area, the rural area installation is placed one category below the urban area installation (and vice versa). In some cases two categories are given when the appropriate category cannot be easily determined.

A CATEGORIZATION OF CONUS MILITARY INSTALLATIONS ACCORDING TO TWO VHA PLANS

State and installation	10% plan	15% plan
Alabama		
Ft. Rucker	5	4
Craig AFB	5	4
Arizona		
Ft. Huachuca	4	3
*Yuma P.G.	5	3
*Gila Bend	5	3
Arkansas		
Little Rock AFB	4	3
*Blytheville	5	3
California		
Los Angeles	1	1
San Diego	3	2
San Francisco	2	2
*Centreville Beach	4	3
Lemoore	4	3
El Toro	2	2
Twenty-nine Palms	5	3
Ft. Ord	3	2
*China Lake	5	3
*El Centro	4	3
*Long Beach	3	2
*Port Hueneme	5	3
*Barstow	5	3
*Camp Pendleton	5	3
*Oakland Army Terminal	3	2
*Sacremento	3	3
Edwards AFB	5	3
Vandenberg AFB	4	3
*Travis AFB	4	3
Castle AFB	3	2
Beale AFB	4	3
George AFB	3	2
*Sharpe A.D.	5	3
*Sierra A.D.	5	3

State and Installation	10% plan	15% plan
Colorado		
Lowrey TTC	2	2
Ft. Carson	4	3
Fitzsimmons A. H.	3	2
Connecticut		
New London	3	2
Delaware		
*Dover AFB	4	3
District of Columbia		
(All installations in metropolitan D.C. area)	1	1
Florida		
Jacksonville	3	2
Pensacola	4	3
Orlando	3	2
*Key West	4	3
*Panama City	4	3
Cecil Fld.	3	2
*Mayport	3	2
Eglin AFB	4	3
Homestead AFB*	2	2
*Patrick AFB	4	3
MacDill AFB	3	2
*Tyndall AFB	4	3
Georgia		
*Athens	4	3
Albany	4	3
Ft. McPherson	3	2
Ft. Gordon	4	3
Ft. Benning	5	3
*Marietta	5	3
*Glynco NAS	5	3
*Ft. Stewart	5	3
*Robins AFB	5	3
*Moody AFB	5	3
Idaho		
*Mt. Home AFB	3	2
*Idaho Falls	3	2

State and installation	10% plan	15% plan
Illinois		
*Chicago	2	2 or 1
*Great Lakes	3	2
Scott AFB	4	3
*Glenview, IL	4	3
Indiana		
Indianapolis and Ft. Harrison	4	3
Grissom AFB	5	3
Iowa		
Rock Island	3	2
Kansas		
Ft. Leavenworth	5	3
McConnell AFB	4	3
Ft. Riley	5	4
Kentucky		
Ft. Campbell	4	3
Ft. Knox	5	4
*Lexington	4	3
Louisiana		
New Orleans	4	3
Ft. Polk	6	4
England AFB	5	3
*Barksdale AFB	4	3
Maine		
Brunswick	3	2
*Winter Harbor	4	3
*East Machias	4	3
*Loring AFB	4	3
Maryland		
Patuxent River	3	2
Ft. Meade	3	2
Aberdeen P.G.	5	3
Andrews AFB	2	1
*Ft. Ritchie	4	3
*Ft. Detrick	4	3
*Bainbridge	4	3

State and installation	10% plan	15% plan
Massachusetts		
Boston	1	1
*Nantucket	3	2
Hanscom AFB	2	1
Ft. Devens	3	2
*Natick Labs	3	2
*Westover	3	2
Michigan		
U.S. Army Tank Command	3	2
*Sawyer AFB	5	3
Wurtsmith AFB	5	3
*Kincheloe AFB	5	3
*Selfridge AFB	5	3
Minnesota		
*Minneapolis-St. Paul	2 or 3	2
*Duluth	2 or 3	2
Mississippi		
Gulfport	5	3
Meridian	5	3
*Pascagoula	5	3
Kessler TTC	4	3
*Jackson	4	3
*Vicksburg	4	3
Missouri		
Kansas City	3	2
St. Louis	4	3
Ft. Wood	6	4
*Richards-Grebaur AFB	3	2
*Whiteman AFB	5	3
Montana		
Malmstrom AFB	5	3
Nebraska		
Omaha	3	2
Offut AFB	3	2
Nevada		
*Las Vegas	4	3
*Fallon	4	3
*Hawthorne	4	3

State and installation	10% plan	15% plan
New Hampshire		
Portsmouth	3	2
Pease AFB	2	1
New Jersey		
Lakehurst	3	2
Bayonne	2	1
Ft. Dix-McGuire AFB	3	2
New Mexico		
Cannon AFB	5	3
Kirkland AFB	3	2
*White Sands M.R.	5	3
New York		
New York City	1	1
Schenectady	3	2
*Griffin AFB	3	2
*Seneca	3	2
*Ft. Drum	3	2
*Hancock Fld.	3	2
*Plattsburg	3	2
*U.S. Military Academy	3	2
North Carolina		
Ft. Bragg-Pope AFB	4	3
*Seymour Johnson AFB	4	3
Camp Lejeune	5	3
Cherry Point MCAS	5	3
*New River MCAS	5	3
*Cape Hatteras	5	3
North Dakota		
Grand Forks AFB	3	2
*Minot AFB	3	2
Ohio		
Rickenbacker AFB	4	3
*Cincinnati	3	2
*Wright-Patterson AFB	3	2
Cleveland	3	2

State and installation	10% plan	15% plan
Oklahoma		
*McAlester	5	4
Ft. Sill	5	4
Altus AFB	6	4
Tinker AFB	4	3
Oregon		
Portland	3	2
Coos Bay	4	3
Pennsylvania		
Philadelphia	1 or 2	1
*Mechanicsburg	4	3
*Indiantown Gap Mil. Res.	4	3
Carlisle Barracks	3	2
Oakdale	4	3
*Letterhenny A.D.	4	3
Rhode Island		
Newport	4	3
*Davisville	4	3
South Carolina		
Ft. Jackson	3	2
Charleston	3	2
*Beaufort-Parris Island	4	3
*Myrtle Beach AFS	4	3
*Shaw	4	3
South Dakota		
*Ellsworth AFB	3	2
Tennessee		
Memphis	5	3
Texas		
Chase Fld.	5	4
Dallas	3	2
Kingsville	5	4
Ft. Sam Houston	4	3
Lackland TTC	3	2
*Reese AFB	4	3
*Sheppard TTC	4	3
Ft. Hood	4	3
Ft. Bliss	5	4

State and installation	10% plan	15% plan
Texas (Cont'd)		
*Corpus Christi	5	4
*Bergstrom AFB	5	4
*Carswell AFB	5	4
*Dyress AFB	5	4
*Ellington AFB	5	4
*Goodfellow AFB	5	4
*Laughlin AFB	5	4
*Webb AFB	5	4
Red River A.D.	5	4
Utah		
Hill AFB	4	3
*Dugway P.G.	4	3
Virginia		
*Newport News	3	2
Norfolk	3	2
Yorktown	3	2
Belvoir	2	2
Ft. Eustis	4	3
Ft. Lee	3	3
Ft. Monroe	4	3
*Dahlgren Lab	3	2
*Langley AFB	3	2
Washington		
Bremerton	4	3
Seattle	3	2
Whidbey Island	4	3
Ft. Lewis	4	3
*McChord AFB	4	3
West Virginia		
*Sugar Grove	4	3
Wisconsin		
*Milwaukee	2	2
Ft. McCoy		
Wyoming		
Warren AFB	4	3

APPENDIX C

CONUS INSTALLATIONS WITH UNKOWN HOUSING COST INDEXES

APPENDIX C

CONUS INSTALLATIONS WITH UNKNOWN HOUSING COST INDEXES

This appendix contains a list of CONUS installations for which MHCs could not be determined. An installation MHC could not be determined if the data in the NAVFAC summary housing expenditure report was unusable, or if the data was not available. Data were not available either because installations were surveyed but, the data were not included in the summary report, or installations were not surveyed in 1975. The 1975 expenditure data for installations which were surveyed but not reported in the summary report are on computer tape at NAVFAC.

Installations in the following list are marked with an (*) if the 1975 data were available but unusable, or a (+) if 1975 data are available on tape but unreported in the summary report. Installations which were not surveyed in 1975 are unmarked. Most of the Army and Navy installations were surveyed in 1975. Many of the Air Force installations which were not surveyed in 1975 will be surveyed in 1976. An (X) beside the Air Force installations below indicates that these installations will be surveyed in 1976.

Installation, State	Total personnel
Navy	
Davisville, RI	42*
Winter Harbor, ME	339*
Cutler, East Machias, ME	126*
Nantucket, MA	118*
Earle Colts Neck, NJ	573+
Lewes DEL	112*
Mechanicsburg, PA	191*
Cape Hatteras, NC	158*
Newport News, VA	2,939+
Cheatham Annex, Williamsburg, VA	182+
Yorktown, VA	664*
Sugar Grove, W.VA	129*
Key West, FLA	4,439*
Mayport, FLA	14,472+
Panama City, FLA	244*
Whiting Fld, FLA	3,027+
Athens, GA	422*
Marietta, GA	688+
Pascagoula, MS	508*
Beaufort, SC	4,772+
McAlester, OK	188*
Corpus Christi, TX	4,074+

Installation, State	Total personnel
Navy (Cont'd)	
Chicago, IL	207*
Great Lakes, IL	27, 459+
Glenview, IL	800+
Indianapolis, IND	302*
St. Louis, MO	189*
Omaha, NEB	268*
Milwaukee, WISC	229*
China Lake, CA	828+
El Centro, CA	622+
Long Beach, CA	4, 118+
Point Mugu, CA	2, 298+
Port Hueneme, CA	8, 796+
Centerville Beach, CA	179*
Dixon, CA	64+
Monterey, CA	1, 701+
Stockton, CA	267+
Fallon, NEV	640+
Hawthorne, NEV	248+
Idaho Falls, ID	1, 531+
Coos Bay, OREGON	101+
Pacific Beach, WA	104+
Annapolis, MD	5, 756+
Indian Head, MD	438+
Wahlgren, VA	131+
Yuma, AZ	3, 771*
Barstow, CA	726+
Camp Pendleton, CA	22, 564+
Albany, BA	812+
Parris Island, SC	10, 786+
Quantico, VA	7, 675+
Moffett Fld, CA	2, 477
Glynco NAS, GA	1, 123
Idaho Falls, ID	1, 537
Bainbridge, MD	1, 721
Alburquerque, NM	456
Las Cruces, NM	184
New River MCAS, NC	4, 409

Installation, State	Total personnel
Army	
Presidio of S.F.	4,108*
Ft. Stewart, GA	2,377+
Ft. Drum, NY	216+
Ft. Hamilton, NY	625*
Indiantown Gap Mil. Res, PA	190*
Ft. McCoy, WISC	100*
Ft. McClellan, AL	4,216*
Yuma Proving Fround, AZ	352*
Sharpe AD, CA	97*
Sierra AD, NEV	284*
Lexington AD, KY	172*
Picatinny Arsenal, NY	155+
Seneca AD, NY	400*
Letterkinny AD, PA	182*
New Cumberland AD, PA	247*
Red River AD, ARK	75*
Dugway PG, UT	317*
White Sands M.R., NM	1,191*
Natick Lab, MA	189*
Ft. Ritchie, MD	1,333*
Ft. Detrick, MD	681*
Vint Hill Farms Sta., VA	829*
Oakland Army Terminal, CAL	654
Sacremento, CA	257
Ft. Snelling, MINN	182
Jackson, MISS	237
Vicksburg, MISS	42
Albany, NY	132
U.S. Military Academy, NY	2,810
Cincinnati, OH	215
Columbus, OH	226
Air Force	
Edwards, CA	4,056*
Vandenberg, CA	5,049*
Patrick, FLA	3,392*
Robins, GA	4,451*
Mt. Home, ID	3,781*
Grissom, IND	3,020*
Loring, ME	4,067*
Sawyer, MI	4,195*

	Installation, State	Total personnel
	Air Force (Cont'd)	
	Minot, ND	6, 376*
	Gilabend, ARIZ	188*
	Reese, TX	2, 399*
	Shepard, TX	10, 088*
	Gunter, AL	1, 200
	Maxwell, AL	4, 104
	Davis Monthan, AZ	7, 156
X	Blytheville, AK	2, 793
X	Travis, CA	9, 035
	USAF Academy, CO	2, 563
X	Peterson Fld., CO	2, 386
	Ent, CO	2, 307
	Dover, DE	5, 151
X	Tyndall, FLA	3, 829
X	Moody, GA	2, 381
	Barksdale, LA	6, 483
	Kincheloe, MI	2, 901
X	Duluth, MINN	1, 437
	Columbus, MISS	2, 630
X	Richards-Gebaur, MO	2, 668
	Whiteman, MO	3, 300
X	Las Vegas, NEV	6, 829
	McGuire, NJ	5, 485
X	Hancock Field, NY	1, 094
X	Plattsburg, NY	4, 055
X	Seymour Johnson, NC	5, 456
	Wright-Patterson, OH	8, 714
	Gentile, OH	124
X	Newark, OH	125
	Vance, OK	1, 248
	Kingsley Fld, OR	462
X	Myrtle Beach, SC	2, 844
X	Shaw, SC	5, 405
	Bergstrom, TX	5, 056
X	Carswell, TX	4, 688
	Dyress, TX	4, 444
	Goodfellow, TX	1, 744
	Laughlin, TX	2, 503
	Webb, TX	2, 157
X	Langley, VA	8, 387